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C. T. HUTCHINSON
Editorial Director

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G. C. TENNEY
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COMING from a noted engineer this remark, made recently at a symposium on the Boulder Dam situation, is an editorial in itself: "Los Angeles wanted water in the worst way so it undertook to get it in the worst way."

ACCORDING to the Public Ownership League, "the only country in the world that does not own and operate its telegraph and telephone systems as a part of its postal service is the United States of America." That may account for the fact that the United States is the only country in the world where a subscriber can place a telephone call with a reasonable assurance that it will be completed, or can send a telegram with the same happy certainty that it will be delivered to the person to whom it was sent.

Hoover for President

HERBERT HOOVER has officially accepted the nomination of the Republican Party for President of the United States. With politics ELECTRICAL WEST has never concerned itself, regarding this phase of life as a matter outside of the sphere of an industrial publication.

In Mr. Hoover's candidacy, however, there are conditions so unusual as wholly to justify a change. For this reason ELECTRICAL WEST desires to express its belief that the candidacy of Mr. Hoover offers a great opportunity to the electorate of this country.

A scrutiny of Mr. Hoover's speech of acceptance is in itself illuminating. The issues before the people are solely economic. There are the problems of the farmer, the Mississippi flood control, the development of the Colorado River, better transportation, the immigration situation, our foreign loans, the welfare of labor, the burning question of private initiative and commission regulation *vs.* government ownership and operation of utilities, and many others.

These are problems for the trained man, the executive, the administrator, the economist and the engineer. And Herbert Hoover is all of these, to a greater degree perhaps than any living man.

Mr. Hoover is not a theory. He is a fact, an established fact. He has known privation, poverty, perhaps even want. He worked his way through college. He has wielded the single jack hundreds of feet underground, slept in a bunkhouse, and stood in line with his fellow miners on payday.

His rise has been rapid, almost meteoric, but the man himself was little known outside of engineering circles until the great emergency of the World War brought him into prominence as the man of the hour. Since 1914 he has been prominently in the public eye as the first choice whenever a great, seemingly impossible task has confronted the nations of the world.

It has been said of him that he is not a politician. Perhaps not, in the interpretation ordinarily attached to the word. But in a broader sense, none but a master politician could have met the jealousies, the personal animosities of the many warring interests concerned in Belgian Relief, the American Food Administration, and lastly the Department of Commerce, and by the sheer force of his own personality compelled people to forget their differences and work together for the common good in the interest of public service.

Hoover the student, Hoover the miner, Hoover the engineer, Hoover the builder and developer, Hoover the humanitarian, and now Hoover the statesman is worthy of becoming Hoover the President.

In Defense of the Electragists

UNDER the headline, "Power Trust Assailed by Electragists," a story published in the Hearst press co-incident with the recent Chicago convention of the Association of Electragists has resulted in considerable speculation among those members of the electrical industry not cognizant of the facts. The story contained the purported text of a letter addressed to the executive committee of the association by A. B. Walton, who was credited with being "The Washington representative of the Electragists."

As a matter of fact, the author of the letter has had no affiliation whatsoever with the Electragists since January of this year. His letter, as well as his demand that the Electragists send a representative to Washington to assist in the Federal Trade Commission investigation of the utilities, was considered so inconsequential by the executive committee as not even to warrant a reply.

In commenting upon the situation Clyde L. Chamblin, president of the organization, declares that the Hearst press statements were "without foundation of fact." Says President Chamblin:

"Mr. A. B. Walton, a self-constituted representative of the electrical contractor-dealer industry but in no way connected with our association, sent to the association an invitation for us to send a representative to Washington to co-operate with him in pursuing the federal investigation now going on. The letter was read in the executive committee meeting and will not even be answered. The members of the executive committee were unanimous in feeling that Walton had been very presuming in sending the letter and that the suggestion that we send an official representative to co-operate with him was both preposterous and absurd. . . . Regardless of what may be published in the daily press to the contrary, I do not hesitate to say

that our Chicago convention has passed into history as being the most constructive and contributing more to a united industry than any we have ever conducted."

It is to be regretted that the press was so misled as to attribute to the Electragists the expression of opinion that had its inception solely in the brain of Mr. Walton. It is well known both in the West and in the East that the Electragists are doing their utmost to convert the slogan, "A United Industry," into an accomplished fact.

Does Federal Power Act Give Municipalities Undue Preference?

AN EXAMPLE of what happens when arbitrary legal preferment is allowed to govern, rather than a decision based on sound engineering and economic facts, is presented in the case of the Nevada Irrigation District and the Yuba River Power Company in California. The conflict involved the utilization of the waters of the Yuba River. The irrigation district in its application proposed to divert the waters of that stream into the Bear River watershed for sale to the Pacific Gas and Electric Company for use in its Bear River system of power plants. The diverted water, after release by the power company was to become available for irrigation purposes.

The sale of the water for power generation was intended to provide for the financing of the irrigation project without any material charge against the lands to be irrigated. The irrigation district, notwithstanding predominance of the power features in this plan, claimed the same preference that the Federal Water Power Act accords to municipalities. Despite the admitted superiority of the plan of development proposed by the Yuba River Power Company, the Federal Power Commission yielded to the urgent recommendation of the district authorities and issued a license to the Nevada Irrigation District in 1925.

The project has been constructed by the district, but reports indicate that revenues are materially less than had been anticipated and that construction costs were higher than the original estimates. The manager of the district has resigned, and an additional bond issue is declared to be necessary.

Experience with the Federal Water Power Act, even thus early in its life, indicates that the legal preference given municipalities is not always in the public interest. Until this legal preference is materially changed, engineering and economic facts will be in the background in any controversy regarding the development, under the administration of the Federal Power Commission by municipalities, of water resources.

Oregon May Catch Some Expensive Fish

BY INITIATING four bills to close to further water appropriation the McKenzie, Deschutes, Rogue and Umuqua Rivers, the sportsmen of Oregon are proposing some expensive future fishing for the state as a whole. While the feeling is general that none of the four measures has even a slight chance of passing, one need go no further back in political history than 1924 and recall the Klamath River legislation in California to become aware of the seriousness of the situation.

At that time sportsmen, with the backing of the Fish and Game Commission, initiated legislation to prohibit the construction of any dam or barrier on the Klamath River between the junction of the Shasta and the sea. Despite the appeals of those interested in future industrial growth of this rich territory that might come with the development of the power resources of the stream, the measure passed with a comfortable margin. The reason was simple. The sportsmen had such emotional and sentimental appeals as that this region was "the last spawning ground of the salmon," one of the few remaining "sportsmen's paradises," and many others. They pointed out that mature salmon had never been passed successfully upstream over high dams. Sentiment, rather than sound economic reasoning, won out with the voters and California caught an expensive fish. Witness the 500,000 hp. of undeveloped power on the stream that can never be used to turn a wheel or light a lamp.

While it is pointed out that filings have already been made on the majority of the desirable power and irrigation sites on the four Oregon rivers, it is impossible to foretell at this time what changes future development will bring or what hidden teeth the four proposed bills may have.

Weighed in the scales of desirable economic development, there is little of advantage in the plan of the sportsmen as against the possible future growth of the state as the result of power development or the irrigation of waste lands. Seemingly the sportsmen forget the benefits that they themselves have derived from the work of the power companies in the development of streams. Inaccessible regions have been opened up with the construction of roads; fish have been planted in hitherto unstocked streams; and vacation camps have been opened and maintained. As specific examples we might point to the fish-stocking operations of the San Joaquin Light & Power Corporation and the Southern California Edison Company; the gift to California of a completely equipped hatchery on Burney Creek by the Pacific Gas and Electric Company, and the operation of a spawn taking station and hatchery by The California Oregon Power Company at its Copco plant on the Klamath River.

Fortunately for Oregon there has been no outspoken sponsorship of the bills by the commercial fishing interests. Co-operation between the government, the fishing interests and the power industry has demonstrated that the problem of transporting salmon over high dams can be solved.

It must be remembered, however, that sentiment is on the side of the sportsmen. The light and power industry must not take the proposed measures lightly, or, like California, it will find that Oregon also may have caught an expensive fish.

Marketing Is Problem of Industry Today

CHARLES STUART MILL, who may be regarded as the father of the science of economics, predicated his writings on the hypothesis that production automatically brought about consumption. Many of the present-day students of this complex subject are attacking this theory, and with reason.

In the final analysis there is only one real problem in industry and that is marketing, and in order to market, money must find its way into the pockets of the consumer so that he may purchase what is produced. The consumer's dollar plays the part of the business man's goal. The interesting question is, who is going to get it, or most of it?

It would appear fairly obvious that any sales work that fails to use existing means of distribution to the greatest extent possible is unskillful, unscientific, and

uneconomic. The central stations seem to be finding that out, for an interesting change in load-building methods is gradually taking place throughout the Western states.

Not so long ago central station merchandising of appliances was conducted practically independent of the dealer, even in competition with the dealer, and under such conditions of purchase as would effectively prevent the dealer from contending for any share of the business. While today there still are minor causes for complaint on both sides, it is generally true that in the Western states sales of appliances by the power companies, with but one exception, are made at such prices and terms as will enable the independent dealer to offer similar goods and make a fair profit from his sales.

This is as it should be. The more people who sell appliances, the more rapidly is load built, and the greater the progress of the electrical idea. As a result the consumer gets what he wants at prices and terms that represent a fair profit to manufacturer, jobber and dealer.

There is one remaining sore spot, and that is a type of competition between individual power company salesmen and dealers by which company policies are ignored to the detriment of the interests of both the company and the dealer. Salesmen have been known to misrepresent company policies as to servicing and many other matters in order to divert purchases from dealers to themselves. This is a condition that would seem to be an effect of the method of compensation, plus the necessity on the part of the power company of employing many casual men during campaign periods.

There is a real opportunity before the commercial sections of our associations to study salesmen's compensation and its effect on trade relations and load-building. It would be interesting, illuminating, and perhaps solve a vexatious problem that is causing some little irritation.

Credit and the Jobber

A CHANGING economic scene is this of today. Realignments of dealer, jobber and manufacturer in their relations with one another are forced by new forms of distribution and altered markets. Consolidations leave wide gaps in the old order of distribution. And the end is not yet in sight.

In all this evolution of selling, this development of new forms of marketing, what is to become of the individuals—the dealer and the jobber? Are they to be absorbed or will they retain their respective identities to serve in ways that only they can serve despite the pyramiding of organizations all about them?

The answer to these queries is based on the primal law—survival of the fittest. Since the dawn of human history the answer has been the same. Only in one essential has it varied, the definition of what constitutes fitness for the particular process of survival immediately necessary. In this case fitness is written in terms of selling ability, financial stability and the ever necessary third ingredient—courage.

As the lines of the new order are drawn it becomes increasingly plain that the survival of jobbers and dealers depends more and more upon each other. The chain store has been declared to be nothing but a jobbing organization possessing its own retail outlets. Here the closeness of relationship is identity. With electrical contractors and jobbers, in order to maintain a place in the scheme, it may become necessary to approach such identity as nearly as individual teamwork will permit.

Already there has been an extension of selling methods from jobber to dealer. Much more yet can be done in this direction. It is in financial stability, through credit direction and supervision, that most needs to be done. In this one particular alone one of the most serious drains upon the vitality, and hence upon the chances of survival of both dealer and jobber, will be removed automatically—the unfit who leech upon the industry and undercut its financial foundations.

As to courage, there is nothing that can be done by organization or by associations. It is the most personal, most individual prerequisite. Each party must bring its own courage into the relationship. Without it financial stability is an impossible ideal; selling ability non-existent. Without it there is no survival.

From all parts of the country, however, the new ideal of closer financial or credit relationship between jobber and dealer is being realized. The McGraw award for contractors, presented at the Chicago convention of the Association of Electragists, was given for constructive work in establishment of effective credit relationship between dealers and jobbers to the increased prosperity and stability of both. Almost every convention today seeks the advice of credit experts.

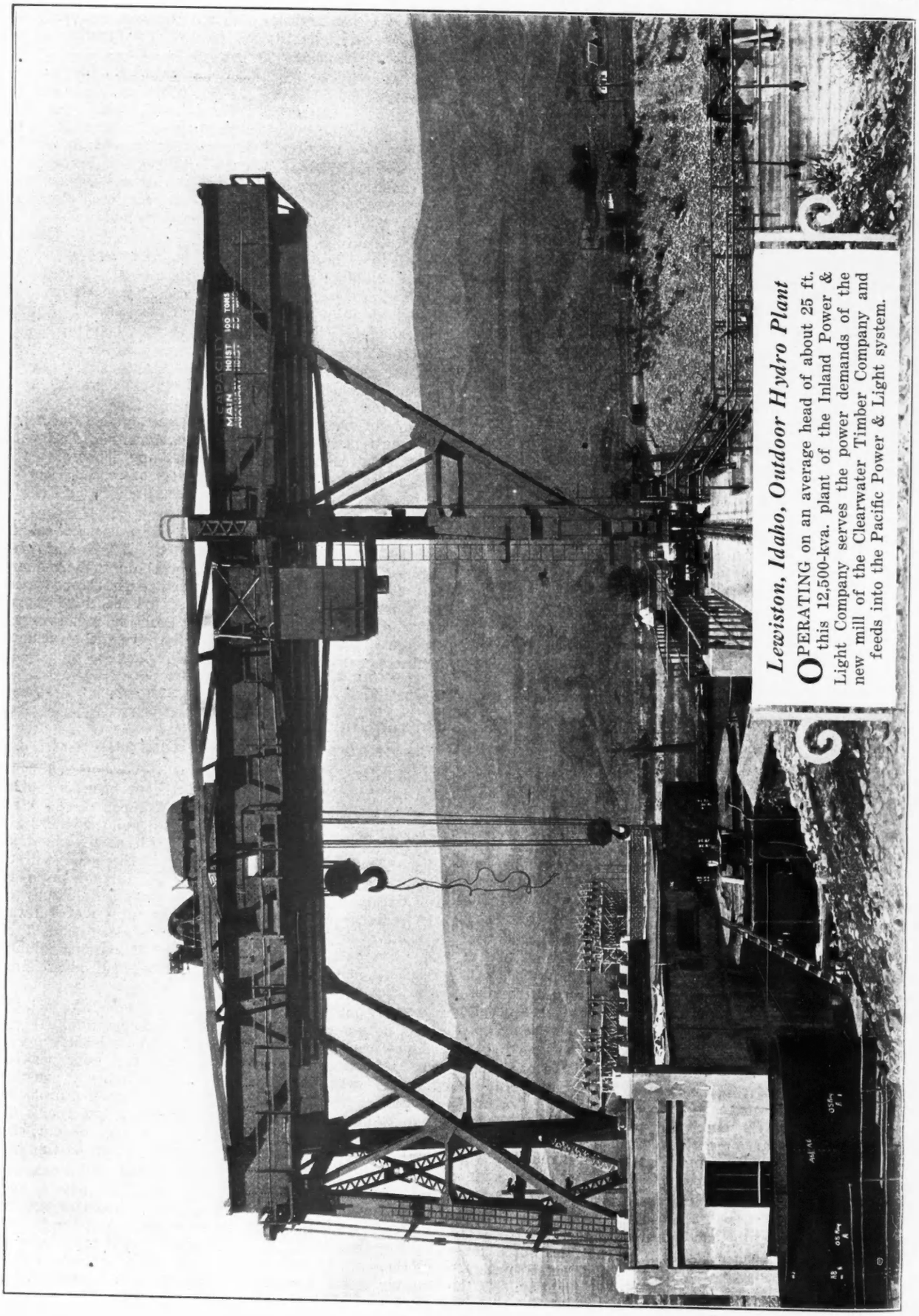
A more important, more vital, more crucial selling job lies ahead for the individualists. They must gird themselves to attack it by first establishing their financial fortifications upon adequate credit foundations. They must muster all they possess of the third ingredient of the formula—courage. Both the other requisites are impotent without it in the struggle to achieve a fitness which will mean survival.

Power Industry Can Profit From Experience of Railroads

IRRESPECTIVE of the type of service offered by a utility, there is ever present the problem of public relations. The railroads, the gas companies, the electric railways, water companies, as well as the light and power companies, are faced with almost identical problems in creating for themselves the good will of their customers. There need be no further proof of the truth of these statements than a careful study of the remarks made recently before a group of railway executives by Paul Shoup, executive vice-president of the Southern Pacific Company. Discussing public relations, and particularly publicity and advertising, Mr. Shoup said:

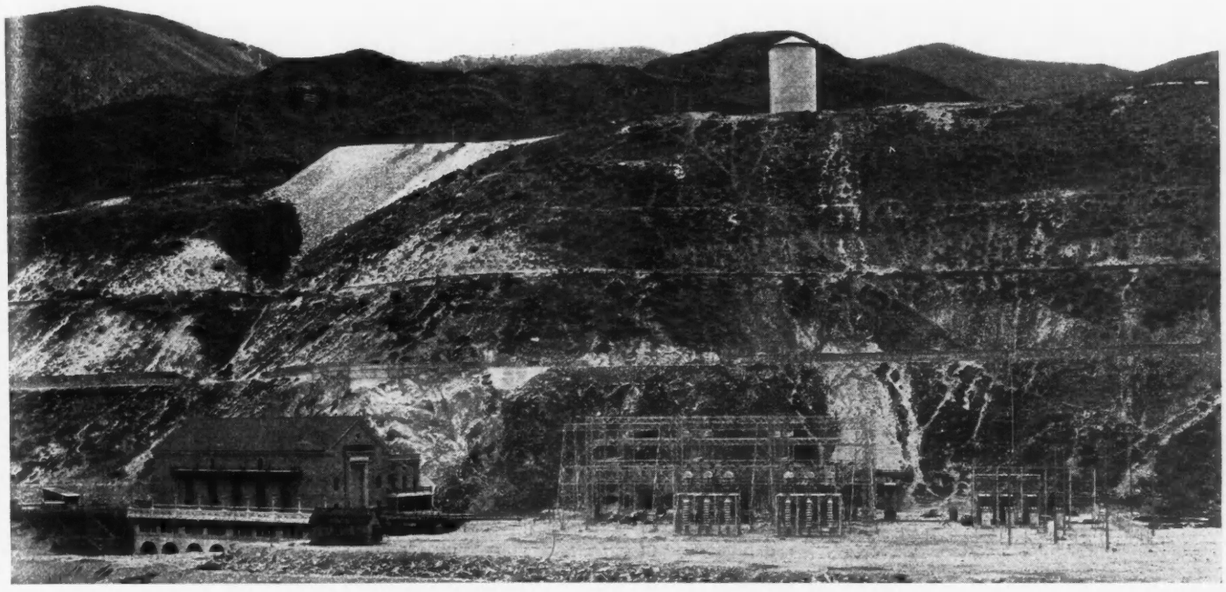
"There must be no assumptions; if you have not the facts do not try to create them by assumption. If you cannot prove your case to yourself you cannot prove it to the public. It is better to understate your position than to overstate it and then be unable to sustain yourself. It is better to deal with specific problems than to get out broadsides of general information. To view our own problems through the eyes of our customers we must put ourselves on the outside looking in."

Here is sound counsel for the public relations and publicity men of the electric light and power companies. Their dealings with their consumers are no different from those of the railroads. And surely this industry can benefit from the advice and experience of another utility that is not only twice as old but has already gone through one experience of operation at the hands of the government.



Lewiston, Idaho, Outdoor Hydro Plant

OPERATING on an average head of about 25 ft. this 12,500-kva. plant of the Inland Power & Light Company serves the power demands of the new mill of the Clearwater Timber Company and feeds into the Pacific Power & Light system.



General view of Chelan powerhouse and switchyard with surge tank on the skyline.

Many Novel Features Involved in

Chelan Project

By E. H. Collins

Assistant Chief Engineer, The Washington Water Power Company, Spokane

THE CHELAN PROJECT of The Washington Water Power Company will develop at one site all of the power economically available in what is known as the Chelan Basin and will utilize practically the entire annual runoff. The Chelan plant is about 40 miles north of Wenatchee, approximately at the center of the north half of the state of Washington and at the western extremity of the interconnected transmission system of The Washington Water Power Company.

First substantial backing was given to the project by the Great Northern Railroad about 1905 and from that time until the summer of 1925, according to the various trends of the times, the railroad varied its activities but never started actual construction. Prior to 1905 the only power to be developed at the site was a small plant which was used until 1927 to pump water and supply electric light and power to the town of Chelan. Also during this period of inactivity on the main project, a small plant of about 1,000 hp. was developed by G. D. Brown at Chelan Falls, between the present dam and the present power house. Since the building of the Chelan plant these other plants have been abandoned.

The Great Northern Railroad was holding the site with the idea of developing it to supply power for its main line electrification. However, in this day of specialization it was only logical for the railroad to limit itself to railroading, relinquishing to the power company the problems of developing and handling the electric power. In 1925, therefore, it was announced that a triangular agreement had been reached between the Great Northern Railroad Company, The Washington Water Power Company, and the Chelan Electric Company, whereby The Washington Water Power Company would obtain the capital stock of the Chelan Electric Company, and providing for the development of power by the power company and for the subsequent sale of power to the railroad company to serve its main line electrification between Wenatchee, Wash., and Troy, Mont.

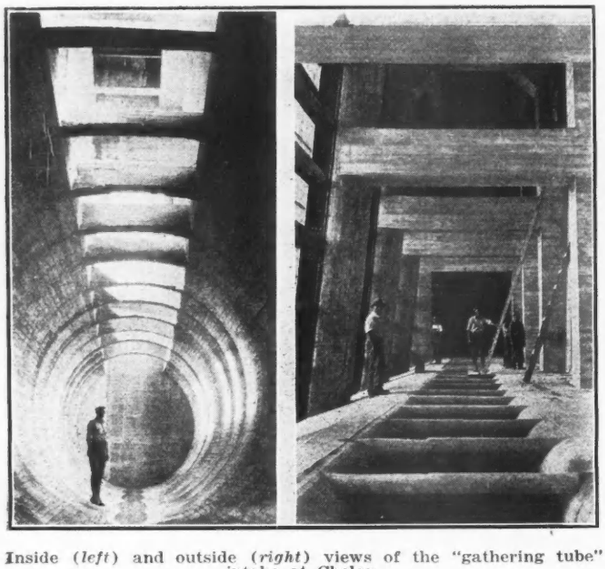
Water Supply

The value of the project is greatly enhanced by its large water storage capacity and the comparative ease with which the 415-ft. available head could be developed in a single plant. The 640,000 acre-ft. storage in Lake Chelan itself combined with the immense storage capacity of the many glaciers within its drainage area allows great diversity in the operation of the Chelan plant. This would be more truly a factor had not the Federal Power Commission placed arbitrary restrictions upon the use of the project from April 1 to Sept. 15 of each year. The intent of these restrictions was not

to interfere with the economics of the project, but situations changed so rapidly that the effect of these restrictions remains to be seen.

Lake Chelan at one place is extremely deep, the bottom being 300 ft. below sea level while the water surface elevation is 1,100 ft. above sea level. It is approximately 45 miles long with an average width of one mile and a water surface of 32,000 acres.

The drainage area contains some 950 sq. miles and portions of the drainage basin rise to an elevation of



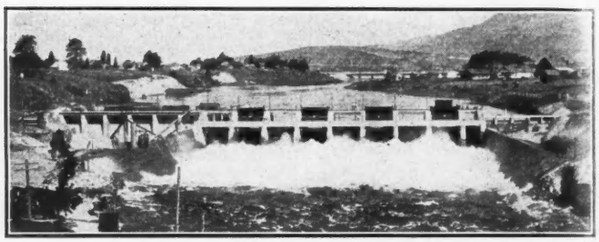
Inside (*left*) and outside (*right*) views of the "gathering tube" intake at Chelan.

8,000 ft. Seventy-five per cent of the inflow comes to the lake through Stehekin River and Railroad Creek, glacier fed streams. Snow survey courses have been established covering the principal portions of the drainage basin and flow records of both of the aforementioned streams are maintained. The practice of snow surveying should be particularly successful on this project because the project provides practically full control of the entire runoff.

As in most hydro-electric developments, natural conditions largely decided the general layout. At Lake Chelan a high dam in the gorge was impracticable because the flooded banks would not hold water. Therefore, the general problem resolved itself into finding suitable foundations for a low-head dam as far down the river as possible, the assurance of its water-tightness, and the location of a power house site with suitable foundations as near to the mouth of the river as possible.

Water Control

At the lower end of Lake Chelan there is a natural dam composed of very compact sand, gravel, clay and boulders, probably the terminal moraine of a glacier.

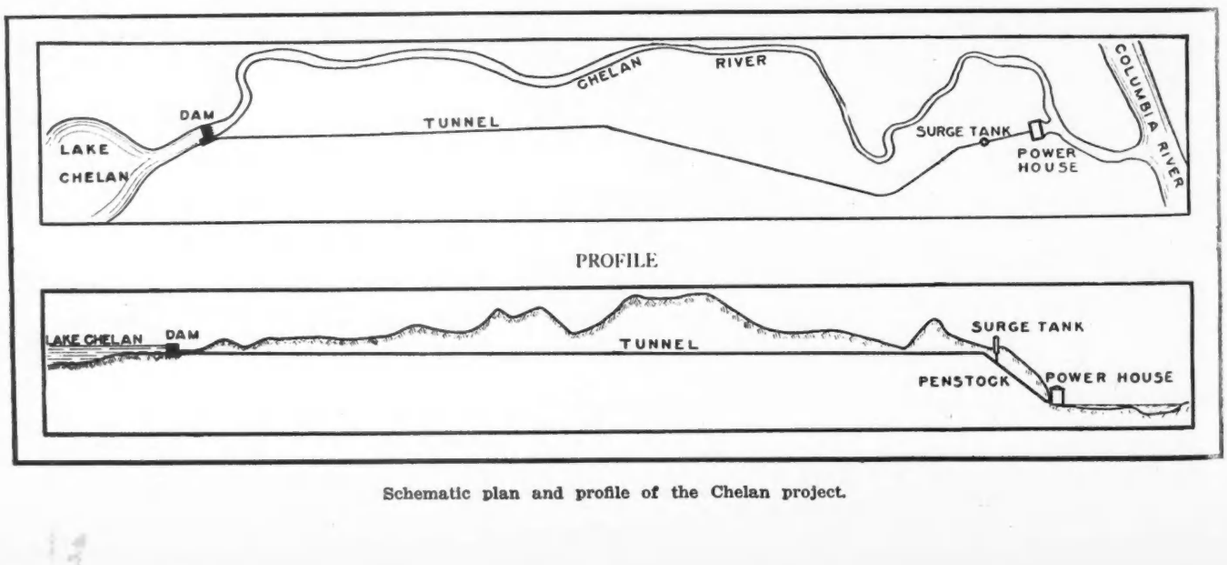


The Chelan dam on May 25, 1928, showing 11,000 sec.-ft. passing through four of the 12 x 20-ft. Tainter gates.

On this moraine was constructed the Chelan diversion dam together with control work and intake structure. This dam was placed about half a mile down the Chelan River below the actual outlet of the lake and provides a 21-ft. depth control (between El. 1,079 and El. 1,100) on Lake Chelan, furnishing the 640,000-acre-ft. normal storage capacity. The dam is a straight gravity section, 30 ft. high from river bed to the upper storage limit and 39 ft. high from river bed to operating platform. The entire structure rests upon a long concrete apron the upstream portion of which forms a long seepage path while the downstream section serves to protect the stream bed from scour and also supports baffles and tumble bays which further prevent erosion and thereby protect the dam from undermining. At the upstream end of the apron there is a cutoff wall 27 ft. deep and at the downstream end a cutoff wall 22 ft. deep.

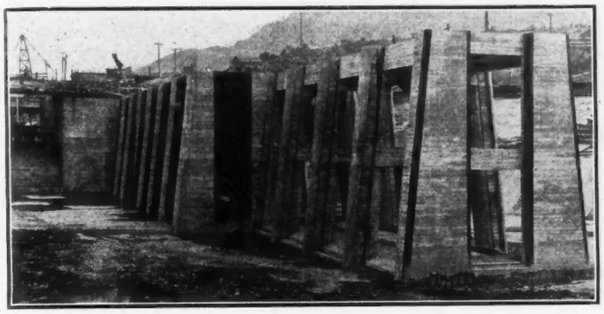
On top of the gravity section are eight 12 x 20-ft Tainter gates providing a flood discharge capacity of 25,000 sec.-ft. The maximum recorded flood is 16,000 sec.-ft. and the maximum estimated flood is 21,000 sec.-ft. At one end of the dam spillways are provided with the crest exactly El. 1,100 to prevent the lake from rising above the maximum allowable elevation.

The Chelan intake is a new type known as the Wahlman "gathering tube." Briefly explained, this intake



Schematic plan and profile of the Chelan project.

amounts to a projection of the tunnel through the dam and up into the reservoir, leaving a tapered slot in the top of the tunnel where it projects upstream above the dam. This slot in the top of the tunnel is slightly above the ground level of the bottom of the reservoir and thus permits maximum drawdown. The slot itself is divided into a large number of sections as is shown in some of the accompanying illustrations and each section has a guiding baffle which tends to direct the water in a downstream or outflowing direction as the



A view of the Wahlman intake structure showing a portion of the screens in place.

water enters the intake tunnel. Turbulence at the intake is reduced to a minimum, greatly reducing entrance losses. This type of construction facilitates the cleaning of trash racks and minimizes the effect of ice conditions. Two such intakes were constructed, one 140 ft. long and 14 ft. in diameter for the first (present) power tunnel serving No. 1 and No. 2 units at the power house, and a second intake, 120 ft. long and 17 ft. in diameter for the proposed second power tunnel and future units. The 14-ft. tunnel is controlled by a 14-ft. butterfly valve designed to be operated under full spouting velocity which valve provides a means of unwatering the tunnel. Stop logs are provided at the upstream face of the dam for the purpose of unwatering the section of the tunnel upstream from the butterfly valve itself. A 36-in. balanced needle-valve bypass is provided around the butterfly valve for the purpose of filling the tunnel.

The present tunnel from the dam to the power house is 11,800 ft. long and 14 ft. in diameter. Approximately 2,000 ft. is in earth and the remainder in granite. Of the total length 10,700 ft. is flow line under low pressure and 1,100 ft. is pressure tunnel or penstock. The flow-line section is concrete lined and the penstock section is of steel, backed up with concrete. The concrete lining of the tunnel through the earth section is heavily reinforced but in the rock section, reinforcing is used only where poor rock was encountered.

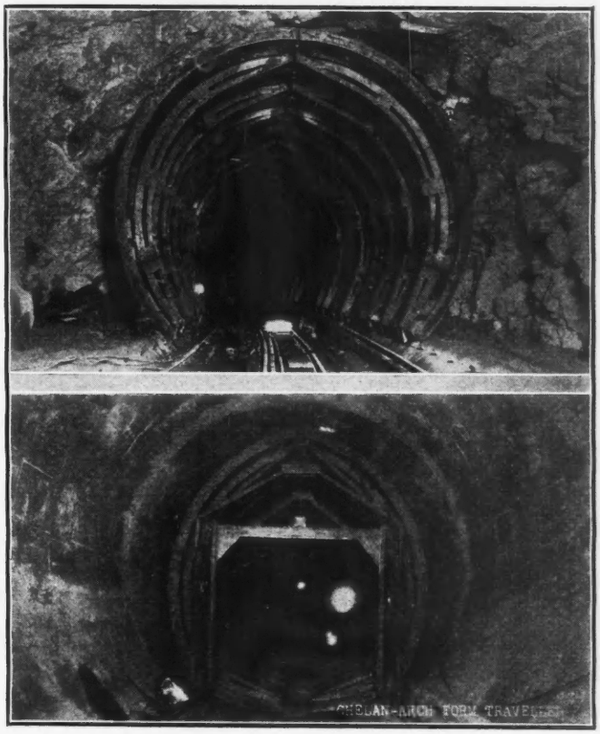
The steel penstock is placed in an excavated tunnel and backed with concrete. The length of the main pipe is 986 ft. and there are two branches, each 8 ft. 10 in. in diameter and 116 ft. long. The main penstock varies in inside diameter in steps of 6 in. from 14 ft. at its junction with the concrete lined tunnel to 12 ft. 6 in. at the Y-branch and varies in the thickness of plate from 3/16 to 1⅛ in.

About 700 ft. upstream from the power house end of the penstock a T-branch provides connection to the 13-ft. riser to the surge tank. The surge tank is of the Johnson differential type, 45 ft. in diameter and 100 ft. high, with its top at El. 1,140, 40 ft. above the maximum elevation of Lake Chelan. The "T" which connects the penstock to the surge tank was so arranged with fillets and an outside grillage that it was unnecessary to put in tie rods as such rods were considered objectionable. The exterior of the surge tank has been painted a battleship gray to harmonize with the surrounding country as nearly as possible and to maintain the policy of the company to make all of its structures interfere as little as possible with the natural scenery.

At the lower end of each of the 8 ft. 10 in. penstock branches are hydraulic valves of the Johnson type. These valves are electrically or manually operated at the valve position and can be closed by remote control from the switchboard. These valves also will close automatically under the condition of too high velocity of water entering the turbine.

Power House

The power house building is on the shore of the Chelan River, approximately one mile from its junction with the Columbia River. During the flood season the high water of the Columbia River reaches the power house building, necessitating some rather unusual construction. To insure water seal on the turbines under conditions of low water, and also to realize the full advantage of the maximum head during the low-water season, the turbines are installed at minimum elevation. To clear the maximum expected flood water elevation incident to Columbia River floods the elevation of the generator floor had to be kept relatively high. This resulted in rather a long shaft connection between the turbine and the generator.



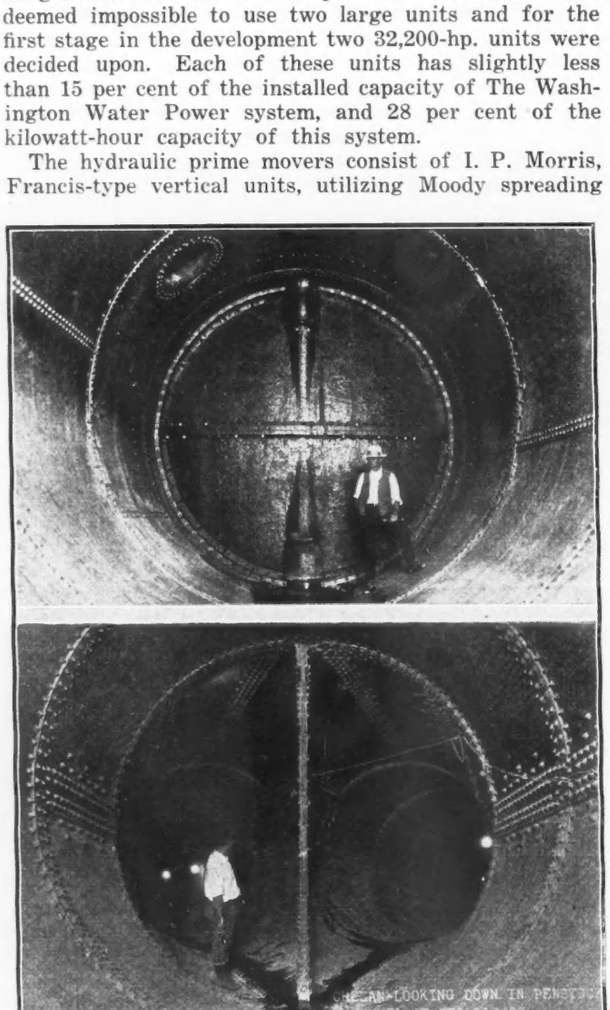
Circular steel form in place in Chelan tunnel ready for lining placement (*above*) and the steel form partly collapsed and being transferred on the form traveler (*below*).

The power house foundation is in hard granite. The present building was constructed to house two units and also to furnish an erection bay. The substructure is of reinforced concrete while the superstructure is built of brick with a tile roof following the architectural style of the Italian Renaissance, again an endeavor to provide an industrial building of pleasing appearance.

Hydraulic Prime Movers

A study of the Chelan project relative to installed capacity reveals the fact that when operated with the Spokane plant the maximum installed capacity of 100,000 hp. would be necessary at Chelan. Also it was found that at times practically no power at all would be generated at the Chelan plant. Therefore, it was deemed impossible to use two large units and for the first stage in the development two 32,200-hp. units were decided upon. Each of these units has slightly less than 15 per cent of the installed capacity of The Washington Water Power system, and 28 per cent of the kilowatt-hour capacity of this system.

The hydraulic prime movers consist of I. P. Morris, Francis-type vertical units, utilizing Moody spreading



The 14-ft. butterfly valve at the head of the flow line (*above*) and the penstock Y-branch (*below*).

draft tubes. At the present time each unit operates under a maximum gross head of 400 ft. but at a later date an additional 15 ft. of effective head will be obtained by completing the excavation of the tailrace. Due to the variation in reservoir elevation and to the fluctuation of the tail water caused by the rising and falling of the Columbia River, the operating heads will vary during the year. The rated capacity of each unit is 32,200 hp., utilizing approximately 1,000 sec.-ft. at full gate. Each unit is controlled by an electrically driven Pelton-Morris governor, equipped to shut down the unit automatically in case of failure of the electric drive on the governor or in case of run-away.

Oil pressure for the governors is supplied by an electric rotary pump under normal conditions or by an auxiliary pump driven by an impulse wheel which cuts in automatically if the pressure fails due to loss of the electric pump. An air-pressure cushion is maintained in the accumulating tank by means of a small motor-driven air compressor. The system for each generating unit is complete in itself and there is no provision for interconnection between units.

Lubricating oil also is on the unit system for each of the two main units serving all turbine and generator bearings. The system operates under gravity from a storage tank and as the oil flows from the bearings to the oil sump ⅓ of it passes through an oil filter thus serving to keep the oil in proper condition. Duplicate centrifugal pumps, one a. c. and the other d. c., are provided to pump oil from the sump to the gravity supply tank. Under normal conditions the a. c. pump will operate but in case of emergency or failure of the a. c. supply the second pump, operating from the station storage battery, is started automatically. Also an undue drop in the oil level in the storage tank automatically cuts in the d. c. pump and at the same time sounds a warning to the operator. Sight feed indicators are provided on all bearings. Dual temperature alarms also are provided on the main thrust bearings of each unit. An extra supply of oil sufficient for a complete unit is kept in storage at the plant.

Under the provisions of the federal power license it will be necessary to report the flow of water through the turbines. Provision has been made for the Gibson test to calibrate each unit and taps were made in the Johnson valve to endeavor to calibrate it as a venturi meter.

Major Electrical Equipment

Each of the two present General Electric generators is rated at 32,000 kva., 0.8 power factor, 11 kv., 60 cycle 300 r. p. m. These generators are the first hydro-electric generators to be equipped with a closed air-cooling system, using surface-type air coolers. It was necessary to install this type of system on the generators because of the large amount of dust contained in the atmosphere in the vicinity of the Chelan plant during some periods of the year. The generators also are equipped with Greisser patent wedges which give increased air-flow space through the windings.

Each generator has a 140-kw., 250-volt exciter mounted directly on its shaft above the generator. Each exciter is sufficient in capacity only for its gererator, a spare motor-driven exciter providing for emergency conditions.

Arrangements have been made so that hot air from the generators may be circulated through the power house building for heating purposes during cold weather. For fire protection in each generator a sprinkler system is installed which can be turned on manually to drench the windings with water. This system is fitted with a globe valve and a three-way valve in series, with interlocking handles which make it impossible for leakage water to reach the generator windings accidentally. The closed ventilation system is expected to facilitate fire fighting within the generator due to the possible restriction of air supply.

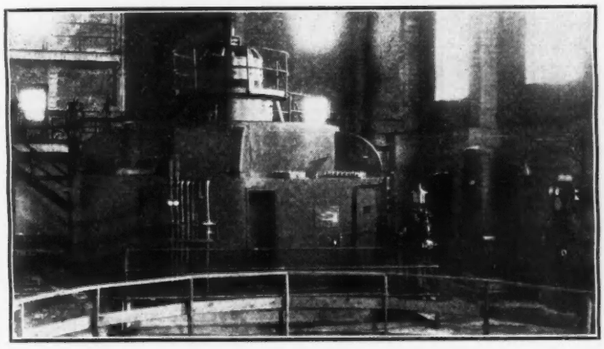
Cooling water for bearings, transformers and the generator air coolers is supplied by duplicate centrifugal pumps which lift the water from the tail race. To insure that the water pressure limit of the generator cooling system will not be exceeded, a stand pipe fitted with an overflow was run to the top of the power house. All drainage water and cooling water that could not be discharged directly into the tail race is taken care of by a duplicate set of centrifugal sump pumps which pumps also are used to unwater the draft tube. Unwatering the draft tube is made possible by tail race gates.

Oil pressure for operation of the turbine gates is furnished by duplicate gear-driven pumps, one driven by electric motor and the other driven by a small impulse wheel. Normally the electric pump will be

used but the water wheel driven pump is arranged to start up automatically upon failure of the electric pump. This system is furnished for each unit and provision is made for interconnecting with other units.

Operating Features

The main operating room is 21 ft. above the generator floor and at what will be approximately the center of the ultimate building. An observation balcony protruding on the generator room side of the operating room gives the operator clear vision of the generator floor and double glass windows provide the necessary sound-proofing. All of the main metering control and relay panels are situated in this room and all of the



View of the No. 1 generator showing the pit for generator No. 2.

company's transmission line telephones as well as the local telephone line comes in on the operator's switchboard. An intercommunicating system provides telephone communication between the operating room and the outdoor switchboard, the turbine floor, the station superintendent's office and the operators' cottages. In addition a Selsyn telegraph system has been installed for transmitting orders directly from the operating room to the governor.

Each generator is tied to the station 11-kv. bus through duplicate Westinghouse oil circuit breakers, either of which may be isolated by disconnecting switches. The Westinghouse transformers and all of the high-tension switching equipment are mounted in the outdoor switch-yard. The low-tension leads between the generator bus and the transformers are made up of two 2,000,000-circ.mil lead-covered cables per phase strung through fibre conduit and concrete duct lines. The use of such large cable was decided upon as a result of a thorough investigation of the problem of heat radiation from the duct line. The duct line is located in a sand fill which in hot weather is very dry and has a high heat resistance. These conditions necessitate the use of large cables to insure proper operating temperatures. As an additional protection temperature protector coils are installed at various points in the duct line and on the cable itself so that cable temperatures may be observed. Further, a forced-air ventilation system has been installed to ventilate the duct lines in case the cable temperatures become too high.

The high-tension bus is designed for a complete double bus installation but with the first two units only one bus and a transformer bus arrangement have been completed. It is expected to complete the double-bus installation at the time of the completion of the third unit. Oxide film lightning arresters are provided on each of the 110-kv. transmission lines.

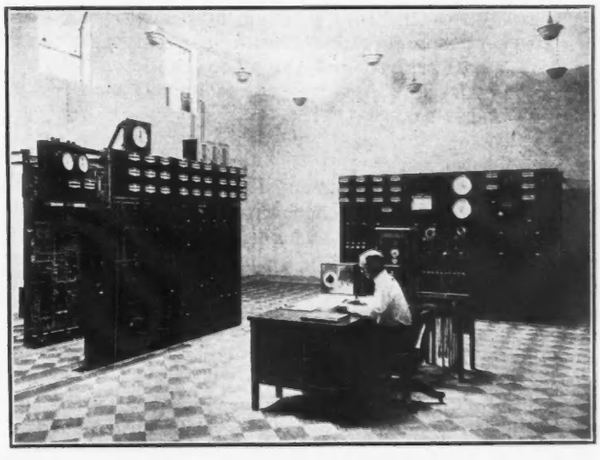
Sensitive differential relay protection is installed on the generators and a separate differential relay installation on the transformers. In addition each of the transformer banks and each of the generators is equipped with induction-type overload relays which are set high enough to insure their operation only in case of bus short circuits within the station itself. The out-going lines are protected by induction-type overload relays with provision for balance protection on parallel lines. All of the local station power circuits also are protected by induction over-load relays and importnat motors are protected by thermal relays.

Since the construction of the Chelan project removed the previously established source of water supply for two local irrigation districts on the banks of the Columbia River in the vicinity of the project, it was necessary to provide a tap from the penstock line to supply these districts with their quota of water.

The same grade of oil is used for both oil circuit breakers and transformers, thus simplifying the oil storage and handling system. Three 3,000-gal. storage tanks are provided and interconnections are made so that oil may be transferred from tanks to equipment or vice versa. Permanent pipe connections are provided for the main transformers, but it is necessary to use flexible hose to handle oil to and from the oil circuit breakers and instrument transformers. The duplicate piping system installed permits oil to be filtered and recirculated to the equipment through the filter press in the oil-handling house adjacent to the switchyard. The filter press pump is so arranged that it can be used for transferring oil without passing it through the filter press.

Two other 3,000-gal. storage tanks are provided, one for governor oil and one for lubricating oil. These are connected by separate pipes to the sump tanks of the oil systems and the oil may be transferred to the systems by gravity.

The design and construction engineering on the Chelan project was carried on by the engineering department of The Washington Water Power Company of which V. H. Greisser is chief engineer, E. H. Collins is assistant chief engineer, A. J. Turner, supervising engineer of construction and T. H. Judd, resident engineer. The general contract, which was held by Grant Smith & Company of Spokane, was in charge of H. H. Hunt, vice-president, with George Putnam as general superintendent. A completely equipped contracting organization built the first unit of this project in much less time than ordinarily is required on a job of like magnitude. At one period of construction the contractor had 1,250 men working on the main project and clearing the shore line of Lake Chelan.



The Chelan operating room.

A night view of the field showing the intensity of illumination supplied by the airport twin floodlights.

Construction and Lighting of the Sacramento Municipal Airport

By Major Charles R. Blood[1] and W. J. Delehanty[2]

[1] Assistant City Engineer, Sacramento, Calif.
[2] General Electric Company, Sacramento, Calif.

THE CITIZENS of Sacramento have been and are passing through the same phases of air-mindedness as those of other cities in the United States. The demand for a municipal airport has probably not been as insistent here as in other cities of the same population, for the reason that there is located only eleven miles distant the large and well equipped Mather Field, which was developed during the war. It has been idle since about one year after the armistice. The army officials in charge have been generous in permitting local fliers to make use of the field. However, it cannot be considered as available for commercial use. The taking over of the air mail by private contract and the rapid development of commercial aviation has brought about a demand for a municipal airport that will accommodate both commercial and pleasure craft.

The task of planning a suitable airport was assigned to the city manager and the engineering department. This city's form of government naturally causes such problems to be approached from a dollars-and-cents viewpoint. The over-enthusiasm of a small group did not launch the city into a bond issue for airport development.

The engineering department and the city manager made a survey of all possible sites for an airport within a radius of eight miles of the business section of the city. Within this radius is located a tract of land consisting of 812 acres which was purchased by the city in April, 1911, for future park development. An area of 184 acres, which presents proper dimensions for a Class A port, was selected in the middle of the park for study of its possibilities as an airport. It was found that this area could without unreasonable expense be leveled and drained so it would meet all basic requirements. The location gives such natural advantages as freedom from obstacles, is situated on a main paved highway, and is surrounded by park area which can be used for further expansion and which will prevent for all time any development of artificial hazards. It is possible to serve this area with high tension power lines from a direction which does not present any hazards to flying. A splendid supply of soft, pure water is available from wells, and dependable telephonic communication and transportation facilities to the city are already serving the park.

These many advantages, coupled with the fact that this area is already owned by the city, eliminated all other sites within the eight-mile radius, when the cost of the real estate was considered. It is believed that the expenditure of a sum equal to the cost of the land will in a large measure develop the airport. The city is growing rapidly in the direction of this site, so in future it will be nearer the center of population.

The problem of financing the full development has not been settled, but it is thought advisable to develop slowly and as nearly as possible on a pay-as-you-go plan, holding off as long as practicable a large bond issue. Sufficient money was made available from the general fund to grade and level a portion of the field and to install a lighting system described elsewhere in this article.

The grading and draining of this field presented a difficult problem in that the soil consists of red clay

over a very thick strata of hardpan. Water does not drain through the soil at all; whatever drainage there is must pass over the surface. The depressions hold water until it is evaporated. This condition will make it necessary to level the field to such grades as will permit a quick runoff of surface water. The drainage of the area trends to a creek which flows along the north side of the field. It is proposed to grade the field so there will be a uniform slope to the natural drainage course, then to prevent erosion, to give the runways a slight crown and pick up the water drained from these areas in parallel surface drains which will level to main drains located at right angles to the main runway.

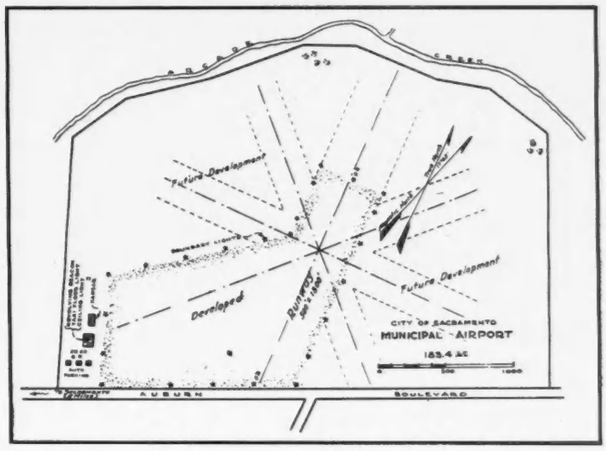
We have corrected the drainage on a portion of the field so there is quick runoff and no water left standing in pools. Under these conditions the clay and hardpan form a very solid surface. Grading was done with a 60-hp. Caterpillar tractor and a Schmeiser leveler, also with small 30-hp. Caterpillar tractors and tumbler scrapers. It is believed the smaller units are more efficient and besides, on account of increased travel, give more compaction.

When the clay surface is dry a fine red dust, which is disagreeable, is stirred up in dense clouds by air currents from the propellers. Treatment of the area in the vicinity of the hangars with light oil as a dust palliative is proposed. Oils of different asphaltic content are being experimented with to learn which are the most effective.

Natural landmarks such as the Sacramento and American Rivers, and artificial landmarks such as the state highway and the main line of the Southern Pacific Railway, make the location of the field very easy to fliers. It is also at sufficient elevation to be out of heavy fogs that sometimes develop along the river bottoms.

A plan of the field as shown on the accompanying map contemplates a circular field 2,500 ft. in diameter with runways developed. The main runway, 500 ft. wide, in the direction of prevailing winds, is to be constructed with the first funds available. Then runways 300 ft. wide at right angles and 45 deg. angles to this main runway will be built as needs develop. Where possible the area between runways will be surfaced so that eventually the entire area will be suitable for landing and taking off under all conditions of weather.

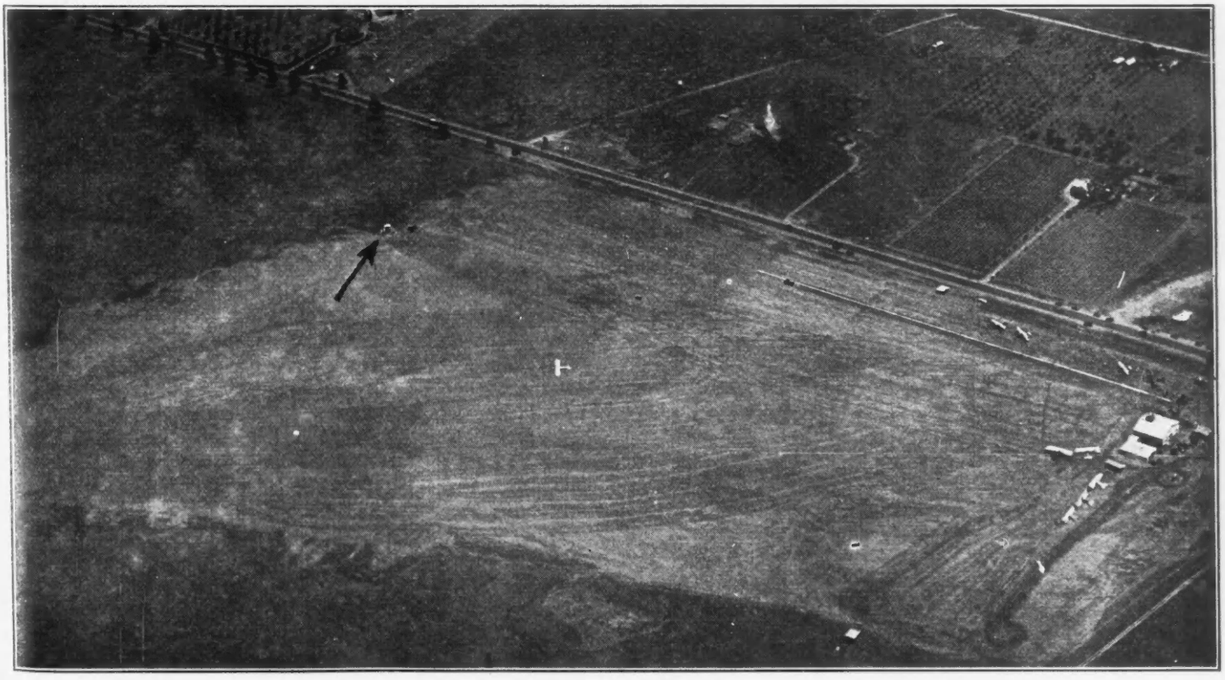
It is believed that in so designing and laying out for



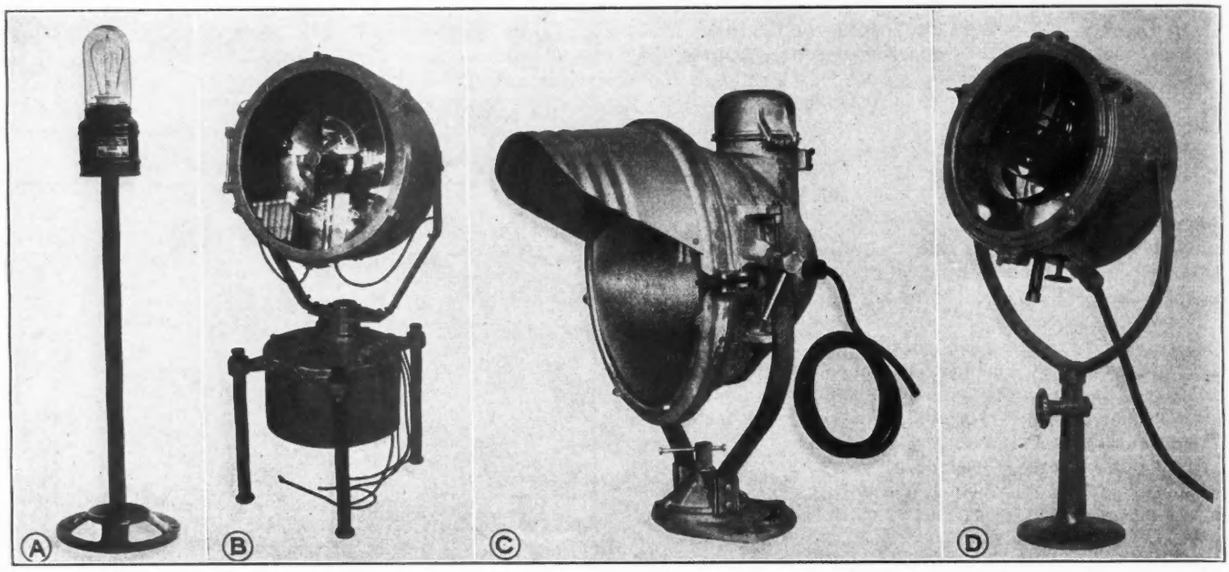
Layout of the Sacramento Municipal Airport showing developed section.

the future we will be able to advance our airport as rapidly as the needs for such are apparent without burdening citizens of Sacramento with a large bonded indebtedness for this purpose. Demands may be such that a small issue of perhaps $500,000 will be required, but this will not be burdensome when compared to millions of dollars other cities have bonded themselves for to make a capital investment in an area sufficient for an airport and provide improvement of that area.

The management of the airport has been turned over to a group of local aviators who are conducting a school for aviation. These experienced men use the area and have provided for themselves hangar space



Aerial view of the Sacramento Municipal Airport. Arrow indicates location of airport twin floodlights.



Type of lighting equipment installed at the Sacramento Municipal Airport. *A*—Boundary lighting fixture. *B*—Revolving beacon. *C*—Floodlighting projector fitted with visor used as taxi light. *D*—Hand control incandescent searchlight used as ceiling light.

and such facilities as a headquarters building, gas and oil station, and a restaurant building. They pay the city a small monthly rental for the use of the field. This provides them with facilities to carry on their school at reasonable cost, and affords the city expert service on the field. This is a happy situation, for were the city to attempt to engage men qualified to supervise an airport a considerable payroll would be added to the expense.

The commercial aspect of this lease to the group of aviators we believe is stimulating a legitimate business which benefits a group of men who are doing their best to advance the cause of aviation. In so far as the municipal airport can become self-supporting from a purely commercial standpoint it will advance and be an asset to the community. For this reason we hope to keep the airport growing abreast with the commercial demands for its use and not invest large capital sums that will be burdensome to the taxpayers.

Lighting Equipment

Since night flying schedules are maintained over the Los Angeles-Seattle airway and because plans are under way for night flying over the transcontinental airway, considerable attention was paid to the lighting of the Sacramento Municipal Airport.

The airport beacon, the most essential unit in the lighting installation, is mounted on a platform on the top of the hangar. This unit has as its light source a 900-watt, 30-volt, 30-amp. incandescent lamp served with power from a 125-volt alternating circuit through a 1,500-watt, 125/30-volt transformer. Through the use of a 24-in. silvered glass mirror the light is concentrated in a narrow beam of 8,000,000 c.p. The barrel of the beacon is of cast aluminum supported on trunnion arms attached to a rotating turn-table which revolves six times per minute. Power is fed to the lamp through metite brushes and brass collector rings. A double contactor "character wheel" is used to flash the auxiliary red "on course" light which gives the pilot his location.

Boundary Lights

Next to the beacon in importance to the pilot on a night flight are the boundary and obstruction lights. The boundary lights at the Sacramento airport are spaced 275 ft. apart and outline the pattern of the field as shown in one of the accompanying illustrations. The boundary lighting units consist of a series street-lighting socket mounted on a 4-ft. section of 1¼-in. iron pipe screwed into a cast iron supporting base 12 in. in diameter. Each unit is equipped with a 6.6-amp., 60-c.p., 600-lumen clear lamp and is provided with a film cut-out to complete the circuit in case of a burn-out. At each end of the runway there is a single boundary light equipped with a green globe and 100-c.p. lamp, which serves to indicate the best direction of landing. To mark obstructions such as the power transformer platform and the field floodlight house, boundary light fittings with red globes and 100-c.p. lamps are used.

The boundary, approach and obstruction lighting circuit is supplied with current from the secondary of a 3-kw. constant current transformer, mounted on a platform near the headquarters building. Power from the 2,300-volt supply line is carried through two emulsion cut-outs to a pole-type Novalux controller. The boundary lights may be controlled from the desk of the airport superintendent through the operation of a small pushbutton or by a time switch. The boundary light circuit consists of No. 8, single-conductor, 600-volt Parkway cable. This cable is buried in the ground without conduit and will not be injured by rocks or moisture. At the two ends of the circuit single-pole potheads are provided to keep out water.

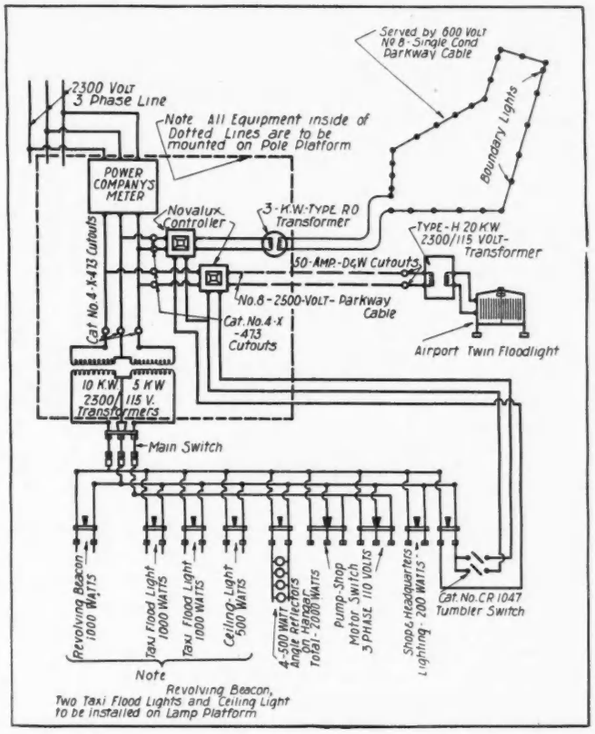
Landing Floodlights

In any typical night landing the beacon serves to locate the field for the pilot, the boundary lights outline its shape and limits, the green approach lights show the pilot the best direction of landing and the red obstruction lights point out hazards and obstacles which might cause a wreck if unmarked. To further increase the safety of night landing at the Sacramento Municipal Airport, ground illumination is supplied by means of an "airport twin floodlight" that is mounted in a specially constructed house on the northeast corner of the runway.

The light source of this floodlight consists of two 10,000-watt, 125-volt incandescent lamps. Each lamp is equipped with a 24-in. ground glass, silvered mirror and diverging front door glass of special construction. The two lamps operating together give a beam spread

of over 80 deg. with an upward stray light cutoff of under 5 deg. to prevent glare in the eyes of the pilot. On the back of the floodlight there is mounted a magnetic control panel which automatically connects the two lamps in series 30 sec. for warming up and at the end of this time changes the operation to multiple. To remove the heat developed by the consumption of 20 kw. in the lamp casing, a motor-driven blower fan is mounted on the lamp top and the heated air is discharged through a vent in the roof of the building.

Power for this floodlight is taken from the secondary of a 25-kva. transformer located on a cement base under the building. A short run of 4/0 cable connects the lamp contactor panel with the transformer secondary through a 200-amp. fused safety switch.


Served by 600 Volt No 8 - Single Cond Parkway Cable
2300 Volt 3 Phase Line
Note All Equipment inside of Dotted Lines are to be mounted on Pole Platform
Boundary Lights
POWER COMPANY'S METER
Novalux Controller
3-K.W.-TYPE RO Transformer
TYPE-H 20 KW 2300/115 VOLT-Transformer
50-AMP.-D&W Cutouts
No.8-2500-VOLT- Parkway Cable
Cat. No. 4-X 473 Cutouts
Airport Twin Floodlight
10 KW 5 KW 2300/115 V. Transformers
Main Switch
Revolving Beacon 1000 Watts
Taxi Flood Light 1000 Watts
Taxi Flood Light 1000 Watts
Ceiling Light 500 Watts
4-500 Watt Angle Reflectors Total 2000 Watts
Pump-Shop Motor Switch 3 PHASE 110 VOLTS
Shops, Headquarters Lighting 200 Watts
Cat. No. CR 1047 Tumbler Switch
Note
Revolving Beacon, Two Taxi Flood Lights and Ceiling Light to be installed on Lamp Platform

Wiring diagram of electrical installation at the Sacramento Municipal Airport.

The primary of the transformer is connected through two D & W oil cut-outs to a 2-conductor, 2,500-volt, No. 8, twin-conductor Parkway cable which is carried in the same trench with the border light circuit back 1,900 ft. to the power platform. Here it terminates in a Novalux pole-type magnetic oil contactor, the same as is used on the border light control. Two-conductor potheads are used at each end of the twin floodlight cable line to keep out moisture. As in the case of the boundary lights, the floodlight is controlled by a push-button on the desk of the airport superintendent.

Normally the large airport twin floodlight is only operated for a few minutes to enable the pilot actually to land his plane on the runway. Due to the large power consumption and the comparatively high cost of lamp renewals, it is considered good practice to "kill" the lamp after the incoming pilot has taxied off the runway and no longer requires the light for landing. For lighting the "taxi lane" and the area in front of the hangar, two type L-24, 1,000-watt floodlighting projectors are mounted on the hangar platform. These lamps serve to light the area in front of the hangar for removal of mail, taking on passengers, fuel and freight and for minor repairs or adjustments. The floodlights are fitted with light shields on the upper part to prevent light spillage in a vertical plane.

To light the roof of the hangar so that the incoming pilot may see the distinguishing letters which identify the field, four 500-watt lamps, each in an RLM angle reflector, are mounted on the corners of the building The "ceiling" light used to measure the height of a fog bank or cloud bank above the field consists of a type J-69 incandescent searchlight that is mounted on the hangar platform.

Power for the operation of the lighting equipment on the Sacramento airport is supplied by the Great Western Power Company at 2,300 volts, 3 phase, 3 wire. Metering is done on the primary side and the City of Sacramento owns all of the transforming equipment and control apparatus. The office buildings are electrically heated and provision is made in the hangar so that power for small cockpit heaters may be taken from plug circuits. A tabulation of the capacity and average burning time in a twenty-four-hour period for the various lighting units is given below:

Unit	Capacity in Watts	Hours Used
1 Beacon light.	1,000 including motor.	Sundown to sunrise.
28 Border lights.	1,900 including cable losses.	Sundown to sunrise.
2 Taxi lane floods.	2,000.	Approximate 6 hr.
4 Taxi roof lights.	2,000.	Sundown to sunrise.
Ceiling light	500.	30 minutes.
Airport twin flood.	20,000.	Approximate 10 minutes for each landing and take-off.

Operating experience with the lighting equipment at the Sacramento Municipal Airport indicates that it serves the purpose of safe and speedy night landing in a satisfactory manner. All of the electrical equipment was manufactured by the General Electric Company and the engineering design of the field lighting was drawn up in the Illuminating Laboratory at Schenectady. Latourette-Fical Company of Sacramento was the contractor that installed the lighting equipment.

Airport twin floodlight showing special house constructed for its protection and red obstruction light mounted on roof.

Putting a Soul Into the Corporation

By Al C. Joy*

Publicity Manager, Great Western Power Company and San Joaquin Light & Power Corporation

ONE IS expected to present one's views as to the subject which is of greatest importance to the industry. I would say that it is the attitude of the public toward us. And that does not mean necessarily our public relations, for such relations may be extremely cordial and yet not be a reflection of public attitude. We of the individual power company may render service that is perfunctorily perfect; we may be so mechanically efficient as to keep complaints at a minimum and to adjust those complaints to the customers' satisfaction; we may have the biggest payroll in our community and therefore be the chief factor in its business welfare; we may be spending millions of dollars in construction work every year and therefore be the chief factor in the community's development. And yet in all these highly satisfactory angles of public relations we may have failed to create genuine understanding of ourselves and our business and to establish a favorable public attitude.

SAYS the author, "Legally the corporation has no soul, being merely an artificial person created by law. But we can refute the legal maxim if we have the right attitude toward our business. For corporations are, after all, made up of individuals, banded in the corporate organization for greater efficiency. . . . . The collective soul of these men and women—hard-working men and women who believe in their jobs—is the soul of the modern utility corporation—a soul that seeks to express itself in sincere, efficient and courteous public service."

This understanding we are seeking is not merely a comprehension of technicalities, but an appreciation of the essentially human side of the business. If, therefore, we are to concede that the creation of favorable public attitude is a work of first importance to our industry, it follows with this particular line of reasoning that our own greatest effort should be to humanize that industry.

To many citizens there is still something mysterious, something ominous, in the very word "corporation." We still bear the curse of the legal maxim that "the corporation has no soul," and the assumption in some quarters that those who are connected with it are similarly afflicted. Until we can put a soul into it, until we can humanize it as a reflection of our own ideals and our own personalities, we shall have watching us always a vast army of suspicious, doubting citizens, not by any means unfriendly but not to be regarded either as genuine friends. They possess the common and very human trait of being willing to believe the worst about us. And there are always those ready to tell them the worst.

As a first step in humanizing our industry, let us forget our departmental importance and our conviction that but for the particular line of effort to which we contribute our talents, energies and enthusiasms the industry would go to pot. No matter how great any one of us may be, he is by no means indispenable—the world somehow manages to muddle along and make a little progress in the face of numerous important funerals. Let us see the industry as a whole, with ourselves, no matter what our specialty may be, helping to round it out in completeness and efficiency.

It is our duty to preserve and promote this industry for our own individual and immediate welfare. We must recognize that when we fade from the picture there will be others to take our places. And we must further recognize that not only these others as individuals but still other systems and methods of providing utility service are always just in the offing, waiting to take over our jobs if we fail. The public will always have its utility service.

In our business we are representatives of a school of economic philosophy, which holds that government should put only such restraint upon liberties and activities of the people as is essential to the general welfare. Particularly is it our belief that the government should engage in no commercial or industrial enterprise which might adequately and profitably be conducted by private citizens or in which it would be in business competition with private citizens. It is our belief that the administering of laws and the safeguarding of the people and their rights present problems demanding all the time and attention of those delegated with the conduct of government, and that the injection of political control into the affairs of business invariably makes for inefficiency and is attended by innumerable evils. We have before us always the contrast between America, prosperous, progressive and efficient under its policy of private management and initiative, and European nations, poverty stricken, burdened with bureaucracy, and falling behind in standards of living and in achievement under the policy of government in business.

The far-reaching utility service of the electrical industry has been built up under private management. We have reason to be proud of the industry's achievements and particularly of our leaders, the men who in the face of skepticism and not infrequently open derision had the courage to carry on and translate their dreams into realities. The opportunities for individual reward for individual accomplishment, recognized by our constitutional fathers as a necessity of progress and corollary of free government, was the spur that drove them on. In a comparatively brief time this mighty industry has been built up, devoted to public service and, as is demonstrated by this very gathering here today, seeking constantly to make of itself a better, more efficient, more ideal public servant.

The electrical utility corporation exists by sufferance of the people. It recognizes the inherent right of the people to the service it performs. It is regulated by law both as to the rates it may charge and its methods of operation. And such are those regulations that only by the excercise of the most rigid economy and by the developing of the highest degree of efficiency in the conduct of its business can it earn the fair rate of return necessary not only to its progress but to its very

* Excerpts from an address before the Pacific Coast Electrical Association, Pasadena, Calif., June 12-15, 1928.

existence. It is essentially a business institution. It is neither politically minded nor politically controlled. It must earn its own way, and it cannot cover up inefficiencies by blaming a political administration, nor deficits by drawing upon a public treasury.

Great as our business is, sound as we believe it to be in its economic aspects, and sincere as may be our desire to establish higher ideals of service, we are nevertheless face to face constantly with inimical forces concentrating their efforts upon tearing down the structure we have erected. Individuals associated with these forces may be animated by many motives, some by sincere belief that the public would benefit, some by opportunity for personal gain or satisfaction, and some by a mere perverse enjoyment in destruction, like the arsonist who finds delight in watching flames he has started destroy a beautiful building. No matter what may be their motives, as a group they are a recognized menace to our business structure. Whether they are right or wrong is beside the question. We believe them to be wrong and ourselves to be right, and they are entitled to believe exactly the opposite. But believing ourselves to be right, it is not only our privilege but our duty to ourselves and to those principles of freedom and equality which we hold to be truly American, to combat their attacks upon us and to proselyte for our own cause.

Three Groups to Combat

In such combat we have obviously to deal with three elements of our population, leaving out of the picture those persons merely viciously destructive. First, there are the theorists, who honestly and sincerely disagree with our point of view and believe in governmental ownership and operation of public utilities and other essential industries. For them we have or should have the respect to which any honest conviction is entitled. We can scarcely expect everybody to think as we do. There will always be, as there are now and always have been, those persons whose political and economic ideas are revolutionary and who are always seeking to upset the stated order of society. They constitute a very small but a noisy and busy minority.

Second, there is the demagogic group, made up not only of political but of journalistic demagogues. These persons make a specialty of attacking capital, usually because doing so is advantageous to them for either political or business reasons. They pose as the friends and defenders of "the masses," whom that fearful ogre, Capital, is attempting at all times to grind beneath its iron heel. That society constitutes an endless chain, with every link dependent upon every other link; that Capital prospers only if the People prosper, and that the People prosper only as Capital can keep the wheels of industry and commerce revolving, is a thought never advanced in their fulminations. Their stock in trade is half-truths, cheap and threadbare platitudes, shallow trickery and mental jugglery. Rarely are they sincere, and for them as a class we have no respect whatever. Yet the persons in this class are far more dangerous to the economic structure of which we are a part than the mere theorists, because they are not hampered by conscience and are unscrupulous in their methods of attack. They too are a small but noisy group, and neither they nor the first group I have meneioned, the theorists, would be worth a second thought were it not for the third group and their possible influence with it.

This third group is that vast army of citizens to which I have referred, constituting the public force which by its attitude toward us determines our destiny. By this group we stand or fall; its ultimate decision will settle whether our economic philosophy or that of our opponents shall prevail. Here are the people among whom we must create understanding; here are the people for whom we must humanize our industry; here are the people who must be made conscious of the soul of the corporation. It is to them that the proponents of government ownership are directing their arguments and as they are influenced by those arguments and by the propaganda against us our problem of winning their esteem and support becomes more difficult.

A rehearsal of the attacks to which the industry has been subjected in recent years only serves to emphasize to us the necessity first of all of complete understanding of our greatest problem among ourselves; and second, the necessity for creating a more thorough understanding and appreciation of ourselves among the vast army of consumers. And how is this undertaking to be created? No one man can answer that question; it is to be answered finally only by the collective thought and action of all of us. We are agreed upon certain fundamentals of conduct which are the first primer lessons in public relations. We have adopted and strive to maintain certain admirable standards of service. But we have found that service alone will not suffice. There must be courteous and obliging service—service given not with the mere outward semblance of courtesy, but out of a real inborn desire to serve. And there must be service at a price—a price that will appeal to the consumer and that will justify the slogan we have broadcast in the past two years of activity in load building, "Electricity is Cheap—Use More of It."

But having agreed upon these fundamentals, what are we to do next? Is there something more to be done in combating the attacks that are aimed at the very life of our industry—something that we have not done, or some way of giving more efficacy to the things we are doing?

Steps to be Taken

By all means there should be no letting up of present effort. Our enemies may scoff at us, ridicule us, impugn our motives, question our assertions, try to deny us the privilege of proselyting for our cause; but we should go steadily ahead telling the truth, telling it straightforwardly and without equivocation, using simple words to relate simple facts, leaving to our opponents the field of platitudes and high-sounding and meaningless phrases. This story can be told to the public only by the wise use of printer's ink, and such use can be obtained only if we pay for it. It is part of the cost of doing business as private concerns that we can never expect to get something for nothing. The newspaper unfriendly to us regards everything that may be said adversely to us as news and material for editorial comment; the friendly editor rarely displays equal ardor in our behalf. But the advertising columns of papers friendly and hostile alike are open to us if we want to buy space for honest, legitimate advertising. And I believe we should buy it—buy it in infinitely larger quantities than we have ever bought it before. Horrified wails from Washington notwithstanding, the simple truth is only a few of the power companies over the country are liberal and consistent advertisers, and that taken as an industrial group their advertising expenditures are far below the percentage of gross income that is the measure in other lines of business.

Whatever is told in our advertising should be told above a power company signature. If we are not proud of our business we should not be in it; and if we are proud of it we should have no hesitancy in telling why and of assuming responsibility for the telling. Let us speak out boldly, openly, proudly. The ostrich with its head in the sand and the rest of its anatomy exposed to the view of the wide, wide world is not particularly

convincing. Our advertising should be neither defensive nor explanatory. Truth is its own defense, and simple statements of fact are bound ultimately to carry conviction.

What Advertising Must Tell

But, you will say, what should be in that advertising? What can we tell that we have not already told? We can tell a great deal that has not been told; and what has been told can well be told again and again. Day by day, however, I become more and more doubtful of the value of advertising that deals with the industry's history, with its enormous development, with its finances, and with the abstractions of economic theory involved in its conduct. These are subjects of interest to us, but are they of real interest to the public in general? When the average householder is buying butter or sugar, he is thinking in terms of price, quality and the necessities of his table. He doesn't give a "whoop" about the mechanical processes of sugar-making, the number of persons employed in the industry, or the nation's acreage of sugar-beets; nor do I believe that between several brands of butter he is influenced to order "Danish Creamery" instead of "Golden State" because it comes from a farmers' co-operative factory instead of one privately owned and operated.

We should not flatter ourselves that we are of such importance in Mr. Average Citizen's eyes that he sits up nights to read or think about our business. If he sits up nights it is probably to consider his own affairs, family social or financial, or just to sit up, without considering much of anything. And sitting up, he burns electric lights and possibly seeks extra comfort from an air-heater or an electric fan. Electricity interests him only as he can get comfort and convenience out of it, without having to pay too much for it at the end of the month.

I do not say I am right in this opinion; I merely set it forth as an opinion. Occasionally there is real value in institutional advertising that stresses the development of the business under private initiative and management. I would not advocate by any means that this part of our story should not be told at all. But between a high-sounding advertisement telling a polysyllabic story of the marvellous achievements of the Whoandwhat Electric Corporation with its hundred million dollar investment, and an advertisement setting forth simply that "Ten Dollars Places An Electric Range in Your Kitchen," Mr. Average Citizen is very much more apt to react to the one that really means something to him personally. I can almost hear him say, "By golly, the power company is sure getting this stuff down to where a fellow can afford it!"

Our advertising should deal less with what we think of ourselves, and more with what we think of our customer. The big story we should tell should deal with the particular benefit the customer is able to obtain through us.

Creating a Favorable Attitude

But advertising alone is only a single step toward creating a favorable public attitude,—an attitude of satisfaction not at all concerned with economic or political theory and meeting the government ownership advocate's demand for a change with a mild and disinterested "Why?" The advertising must be a reflection of sincerity of the corporation that stands behind it. And that sincerity must not be characteristic of just the few men who stand at the top; but of the entire organization. The first great work therefore should be done within our organizations. Employees, from the executive staff to the line crews, are the ones who should know intimately the whole story of the industry's growth and development. They are the ones who should be most vitally interested in the preservation of the principles of private initiative and management. They should understand the factors that are arrayed against us, and why; and they should have full and clear explanation of every public situation and controversy in which our industry is involved.

We should not expect nor do we want merely that sort of loyalty that goes with a place on a payroll. We want the sort of loyalty that is born out of understanding and conviction that we are right and that our efforts to serve the public adequately and efficiently are sincere and honest.

Out of this sort of loyalty there should develop a perspective bigger than the industry itself, seeing in departmental specialization merely a contributing factor in the great work of organizational service. That perspective may enable us occasionally to stand off and survey ourselves, calmly and dispassionately, from the point of view of Mr. Average Citizen, who is our customer.

Is the electrical industry to him mysterious? Let us take the mystery out of it. For fundamentally, we are doing nothing more mysterious than is the manufacturer of shoes or butter or sugar; we are manufacturing a certain commodity and delivering it for a certain price to those who want it.

Giving the Corporation a Soul

Let us assume that, because we ourselves are human, the corporation of which we constitute the working force is also human, and being human is full of frailties and prone to make mistakes. And when mistakes are made, let us not alibi, but confess them frankly to other humans and do our best to remedy them.

Do we sometimes create the impression that our corporation is an institution that is in but not of its particular community? Let us prove by our deeds that the social and commercial and industrial development of our communities is something in which we and therefore our company are deeply interested.

Legally the corporation has no soul, being merely an artificial person created by law. But we can refute the legal maxim if we have the right attitude toward our business; and we can obtain a favorable reflection in public attitude. For corporations are, after all, made up of individuals, banded in the corporate organization for greater efficiency. These individuals are in no whit different from other individuals. They are born of woman, they live and laugh, and love; they are warmed by the same sun; their nights are lit by the same stars; they have the likes, the dislikes, the weaknesses, the foibles of all mankind. But they are honest, sincere, self-respecting citizens. They want the respect of their fellows. The town in which they live is their town; they are just as sincerely interested in its progress and development as are its other citizens; they build homes, they send their children to the public schools, they share with their neighbors in the joys and sorrows of neighborhood life and in community pride.

The collective soul of these men and women—hard-working men and women who believe in their jobs—is the soul of the modern utility corporation—a soul that seeks to express itself in sincere, efficient and courteous public service. If we can make that soul apparent as a background of our service, of our advertising, of our sales effort, of our contacts, I believe we shall find a pleasing response from the soul of the great public—an attitude toward us that will build into our whole structure the strength of the ages.

A Phase of Municipal Electric Distribution in California

By E. M. Seel
Berkeley, California

IN California there are 22 municipalities engaged in distributing electric energy to their inhabitants. Only one, the island city of Avalon, generates and distributes its entire supply; and, of the remainder, only 6 generate any electricity at all.

The cities addicted to this form of municipal ownership are, in the main, communities of small population; they do not generate power even for the most important factor of standby service, and, in their purchasing, are benefited by rate schedules which permit them to purchase power at low wholesale rates. Being small, they operate under the distinct advantage of serving only congested areas, thereby curtailing any large costs in the maintenance and operation of the distributing system and reducing the personnel.

MUCH attention has been directed by some elements of the daily press to the so-called "success" of municipal utilities in certain California cities. In this article the author deals with an important phase of municipal ownership and reviews the claims of progress made in one city.

These cities operate without supervision or regulation. It is presumed, perhaps logically, that where a political subdivision of the state, such as a municipality or "utility district," undertakes the distribution of a particular utility commodity, this is done with the consent and for the benefit of the entire citizenry; that, since each inhabitant of the community or district has a voice in the management and control of the utility via the ballot and, since the primary and impelling thought behind municipal management is service with little profit, if at all, there is no necessity for either state or federal regulation of rates or service.

This immunity from regulation, naturally enough, accords the municipal utility many advantages denied private enterprises engaged in the same business. The most important of these advantages, briefly summarized, are:

(1) The municipal utility's entire financial structure, capital and income, is tax-exempt. In California, private power interests are compelled to pay state, federal, county and municipal franchise, and other taxes, the aggregate of which is approximately 10 per cent of gross earnings.

(2) Municipal utilities are supported by the combined taxing and bonding capacity of the community, and by using this taxing and bonding capacity obtain capital at very low rates of interest. The private enterprise is forced to enter the competitive money markets to borrow its capital and, in interest, pay the current wages of money.

(3) Rates for service which a municipal plant charges are dictated at will by the operating heads. They may be either high or low, depending upon the amount of revenue it is desired the system shall produce. Those of the private enterprise are established by the California Railroad Commission, and are such as represent not more than a fair return on the property values of the facilities installed to furnish electric service.

(4) The municipal utility's activities are generally confined to congested areas permitting the greatest revenue per dollar invested, whereas private enterprise is engaged in business over a wide-spread area of urban, suburban and agricultural districts, and, for the better economic development of the state, is compelled to serve the lean and scattered territory where the return per dollar invested is low and the costs of operation are high.

(5) The municipal utility is not concerned with its source of energy. It allows this burden to rest upon the shoulders of the private enterprise which is forced to anticipate future needs, draft plans and estimates accordingly, and continually develop additional sources of production to meet the growth of demand, including that of the municipal utilities.

(6) Municipal utilities are usually housed in publicly owned buildings for which no rental is charged.

(7) The legislative and executive departments of the municipal government manage and direct the policies of the utility enterprise on their regular salaries paid out of taxes, and, likewise, many city employees perform various duties for the utility in conjunction with their regular duties for which they are also paid out of taxes.

(8) Municipal utilities are not required to conform to or maintain any particular system of records or methods of accounting, whereas a private power company is compelled, by law, to maintain an elaborate system of records, so that every possible phase of its business can be scrutinized, at any time, by the proper public officials.

(9) Municipal utilities are excluded, with certain exceptions regarding overhead electric lines, from any regulations relative to service rendered consumers, such as are imposed on private companies.

The only report of activities required of a municipal electric utility is a more or less *pro forma* collection of statistics forwarded to the State Controller each year for incorporation in his "Annual Report of Financial Transactions of Municipalities and Counties of California." These statistics are so meager and inadequate as to prevent any comprehensive analysis of the utilities' operations. There is nothing to show whether any particular utility makes or loses money; there is nothing to show whether or not the property is properly maintained or whether it has been allowed to deteriorate and become obsolete; there are no data as to rates or character of service.

In most instances information concerning the operations of a municipal utility is closely guarded and only that information which the municipal officials desire to be disseminated is given out. In other cases it is doubted whether information regarding the conduct of the utility over any period of years is obtainable. Political administrations have changed bringing in new operating heads; records, even when compiled, have been lost.

This irregular method of accounting on the part of municipal utilities has become so acute as to move the Controller to make this statement in his recent report for the year ending June 30, 1927:

> The accounting systems of municipally owned public service enterprises are of a character that prevents the Controller from giving adequate information covering their operation. It is impossible to ascertain whether there is a loss or gain, as the statements furnished are, in the main, flow of cash. Each year shows a tendency on the part of municipalities to increase their activities in this direction, and the Legislature should require proper accounting methods for the protection of the taxpaying public. The chief objection to privately owned public service corporations, that are now regulated by state agencies, is that the accounting systems employed by the corporations enable them to secure a higher rate from the regulative agency than would be justified if all of the facts were before them. In an endeavor to correct this situation, the Railroad Commission has compelled the utility corporations to adopt a uniform method that takes into account all of the factors affecting the cost of service. The taxpayer should have the same protection, and governmental agencies might well set an example by the adoption of sound accounting methods and thereby definitely dispose of the controversy regarding costs that now exists as between publicly and privately owned utilities.

The statistics submitted to the Controller often show large sums of surplus profits from operation. These surplus profits are given wide publicity by the newspapers of the state interested in encouraging the doctrines of municipal and governmental ownership, and unsound assumptions are drawn therefrom. Many civic improvements, such as new paving, street lighting electroliers, and even city halls are attributed to these surplus profits from municipal lighting systems. Other cities are urged to follow the lead already established, break away from private service, and, by adopting municipal ownership, enjoy low electric rates, free street lighting, and other civic improvements.

These claims, founded on indefinite statistics and nebulous information, have unquestionably aided in fomenting dissatisfaction among the inhabitants of other communities served by private companies, and encouraged them to believe that if they owned their local electric plants they, too, could enjoy many civic advantages otherwise denied them. Politicians, anxious for a campaign issue, greedily grasp these press reports as statements of fact and from the platform seek converts to municipal ownership in an effort to further their own ends.

Supposed Advantages Do Not Exist

Nominally, in view of the natural advantages, it would appear that the municipal electric plant must exist in truly an Utopian field; that each and every consumer thereof should expect and receive electric service at cost, or at least, a cost commensurate with the normal functions of the plant and much less than could be given by a private company; and that this service, at such low cost, should prove a material and valuable asset to the municipality by way of stimulating industrial and civic progress. The tax rate should be low; the property values high; and the bonded debt kept down to the very minimum in order that outlets could be afforded for the disposition of the municipal system's surplus profits. Service should be of the highest standards; the street and public lighting equipment, as well as that of the system in general, should be the most modern.

But these claims become tarnished when cognizance is taken of many factors of every day life from which the municipal systems cannot be disassociated. These factors are elements of our governmental and social fabric, and are the very antithesis of the theory upon which municipal operation founds its claims of success.

Once launched as a municipal project, the utility system becomes an auxiliary to the local political machinery. Created by politicians for the attainment of political objectives, its operators are appointees with a view to their serviceability for political ends and are not usually the most efficient talent to be procured. Rates are designed, not in conformity with economic fundamentals, but with a view to attracting popular support, entailing discriminations not compatible with the industrial welfare of the community. The accounting system can be, and usually is, juggled at the whim of the operators and made to show profits or conceal deficits of inefficient management. Most of the systems operate without competition, which causes a slackening off in ambition to promote and advance electrical arts; the system and service are ordinarily allowed to deteriorate. Rates are not lower than those served by private companies, but when all the elements of an efficient and modern private system are considered, are found to be higher. This is not to be construed as an indictment but merely the other side of the story.

In an effort to reveal more thoroughly the exact situation of the non-generating municipal electric systems, some reference must be had to the historical growth of the electrical industry in California as a whole. The electric light and power industry has, over the past 20 years, shown a steady tendency on the part of the private companies, toward the interconnection of smaller, isolated and independent companies, and their consolidation into large systems covering widespread areas of territory operating a series of power plants, hundreds of substations, thousands of miles of transmission and distribution lines, serving dozens of counties and hundreds of cities as one single operating unit. From the main power plants situated in the Sierra the transmission lines lead out to the population centers along the Pacific sea-board where the industrial, social and economic progress of the state make the major demands for power. From these lines other lines radiate out for many miles reaching into the surrounding valleys and hills, and appended thereto are the numerous cities, villages and rural consumers attached much in the same manner as individual consumers are served from a city's distributing lines.

The transmission lines of these great systems have opened up and developed virgin territory and made farms and villages of what was once a wilderness exactly as did the railroads when the wilderness was conquered by the first rail transportation. The material aid of these lines and power plants to the upbuilding of the state is incalculable; the rapid progress of California has demanded them; and the evolution and artistry of private power companies have created them.

Through centralized co-ordination of the many complicated functions of utility service these independent agencies have found it possible to distribute power to the sparsely settled suburban and rural territories as well as the densely settled urban centers at much lower rates than was possible under the former status of the industry. The diversity of the demand and use by industries and communities in different sections has resulted in an increased use of facilities not otherwise possible to obtain. This high load factor coupled with the other forms of economies practised has all been of resulting benefit to the individual consumer.

Status of Municipal Plants

It becomes possible, then, to visualize the status of the municipal lighting plants as units of such a system. In the Sacramento Valley of northern California are clustered numbers of small cities, without notable industrial development, which are dependent upon the adjacent agricultural districts for support. These cities are, in a great majority, served by the transmission system of the Pacific Gas and Electric Company. Among them are the small cities of Redding, Gridley and Biggs, only one of which is over 2,000 population, each operating a municipal lighting plant for which it purchases power at wholesale from the Pacific Gas and Electric Company.

For the past several years the press has published many reports dealing specifically with the success and surplus profits these little plants are supposed to have made under municipal ownership. Gridley, in particular, has come in for the "lion's share" of the enthusiastic praise, and in March, 1926[1], and July, 1928[2], at least two California papers devoted their columns to an agitation, having for its primary purpose the incitement and invitation for similar towns to follow Gridley's "prosperous example." The experience of Gridley was held aloft as a glowing torch of civic progress in that, by virtue of operating its electric system municipally and accumulating surplus revenues, it was enabled:

[1] Sacramento *Bee*.
[2] San Francisco *Examiner*.

(a) To rebuild 90 per cent new its depreciated electric system, and to rejuvenate its water system and install a new pumping and sewage plant;
(b) To build a new and modern city hall, electrically equipped; a new fire-house, and purchase new fire apparatus;
(c) To serve the city with free street lighting;
(d) To accomplish all this at lower electric rates than the private power firms serve in like territory.

The total cost of these new improvements was given as $69,533.48. It was stated that the municipal plant has paid for them over a period of five years.

Sufficient curiosity being aroused by these claims, an impartial examination was undertaken of the only sources of information available, namely, the statistical report of the state Controller containing the information supplied by Gridley. From Gridley, itself, it was learned that the municipal distribution of power was undertaken in the year 1908, at which time the tax-rate was 40 cents on $100 of assessed valuation, and the population 1,100. For the fiscal year June 30, 1927, Gridley reports a tax-rate of $1.90; the population is estimated at 2,000 (a gain of 900 people in nineteen years), and the bonded debt is $36,500. The tax rate is reported as $1.90 for the city, but this is not the true rate paid by the citizens of Gridley, since there are special assessments and levies made for schools, library, etc., which increases the rate to $2.89.

From this, a most cursory examination, it becomes apparent without further comparisons that the operation of the electric system municipally has failed to stem an ever increasing tax-rate; it has failed to stay a necessity for bonded debt; nor have its advantages served (other than normally) to augment the city's industrial or popular growth.

Going a step further and selecting at random from the map a half dozen of Gridley's neighboring cities, all practically within a 50-mile radius; all of comparable population, agricultural and economic situation, to-wit: Colusa, Auburn, Oroville, Yuba City, Orland and Red Bluff, but all being served by the same power corporation, it will be observed that each of these cities has a tax-rate much less than that of Gridley; that their values of real estate are much higher; and their growth in population, in nearly all instances, over the past nineteen years, more rapid.

Rates Not Cheaper

All this might be said to mean nothing so long as the citizens of Gridley enjoy cheaper electricity than do the inhabitants of the other cities. But, on the contrary, it is found from the rate schedules filed with the State Railroad Commission by the private company, and the published rates of Gridley, that such is not the case. Electric lighting and power rates in Gridley are today higher, and have been all along, than the rates for service charged by the private companies in like territory. Gridley purchases power at a wholesale rate of approximately 1 cent per kilowatt-hour. This power is sold back to its citizens at the top domestic lighting rate of 8 cents per kilowatt-hour; the private company's top rate available for the same class of service is 5 cents per kilowatt-hour. This means that the citizens of Gridley's neighboring communities not only enjoy a lower tax-rate but, in addition, a substantially lower electric rate; and also proves that the claims made of lower electric rates have hardly been founded on fact.

Over the five-year period June 30, 1922, to June 30, 1927, which are the five latest years of operation which Gridley has reported, Gridley collected from its average of 602 consumers of electricity, total ordinary receipts in the sum of $166,402.48; the electric plant's total ordinary expenses was $111,331.42; bond interest and redemption are reported as being paid for only four of these years in the sum of $12,040. A *bookkeeping profit* is left of $43,031.06. This sum falls far short of the $69,533.48, the cost of the new civic additions and improvements. But, nothwithstanding, we are given to understand that this supposed profit of $43,031.06 has rehabilitated the electric system; purchased the new city hall; installed the new pumping and sewage plant; built a new fire-house with new fire apparatus.

Here is an interesting example in accounting from which the tax-payer receives little consolation: In round figures the electrical receipts collected by Gridley for the years 1923 to 1926 ranged from $25,800 to $29,500, and in 1927 they jumped to $35,600. The plant expenses, excluding bond interest and redemption, ranged from $21,400 in 1923 down to $15,800 in 1927. Gridley's' report shows that $11,300 was paid for power during 1927. Deducting this sum from the total expense of $15,080, leaves a difference of $4,500 to pay for all the additional expenses of the plant including salaries. From this sum of $4,500 the impression is had that it covers expenses such as substation and labor, distribution and labor, complaints, meter reading, collecting, office supplies, and so on, to say nothing about the salary of a superintendent, a lineman, an office clerk and perhaps a substation attendant. Besides these items there still remains a depreciation reserve (if any is maintained) and bond interest and redemption—all to come out of the same $4,500!

Inequitable Taxation

The summary of Gridley's electrical operations clearly indicates that any municipality which desires to engage in the municipal distribution of electricity to its inhabitants, charge a high electrical rate and a high tax-rate, can use the monies collected from these two sources of revenue and purchase any number of civic betterments. This becomes a most unsound and inequitable distribution of the costs of the civic improvements thus purchased since no consideration is taken of the community's taxable wealth, or the capacity of the electric consumer to pay. For instance, where electric revenues are used to supplant tax-funds, an electrical consumer who owns no taxable real property and whose financial standing may be poor but whose electric use, by the nature of his occupation, is high, will be assessed more *pro rata* as his share of the improvements than another citizen whose taxable wealth is great, but whose electric consumption is small. And, likewise, a double assessment is imposed on the citizens who happen to possses properties of large taxable value and who also have a large electric consumption.

The rate at which the private power firms wholesale electricity to the municipal utilities was established many years ago in the formative period of the industry. This low wholesale rate was established by the power firms themselves for the purpose of promoting the industrial progress of the state and disposing of excess power. The rate was later standardized by the State Railroad Commission. Several years ago one of the power companies presented a showing before the commission in which it was represented that it incurred a loss of about 20 per cent through this rate. No decision has, as yet, been rendered by the commission.

The loss the companies suffer by virtue of this rate is made up by other consumers, exactly as the state and federal taxes, evaded by municipal utilities, is collected in the form of higher tax rates on privately owned utilities and passed on by them to their customers. It can well be said that cities like Gridley and others are given the advantage of low rates at the expense of their neighbors; that they evade taxes at the expense of other communities; and that, if any great number of municipalities were to follow their example, the matter would became a most serious menace to the consumers and communities served by private power firms.

Engineering Practice

Power Factor Effectively Corrected on Distribution System

Capacitors Installed on Feeder Circuits at Load Centers Improve Voltage Regulation and Increase Effective Capacity of All System Equipment

By WILLIAM S. HILL*, General Superintendent, Grays Harbor Railway & Light Company, Aberdeen, Washington.

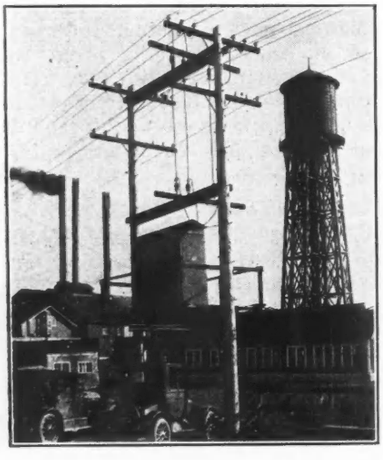


Fig. 1. Typical pole-mounted installation of 4-kv. capacitors adjacent to heavy power consumer.

AN 18-per-cent improvement in system power factor, an annual saving of nearly 625,000 kw.-hr. in power losses, an increase of 45 per cent in effective generator capacity, and timely relief for overloaded lines, transformers and regulators have been accomplished by the Grays Harbor Railway & Light Company of Aberdeen, Wash., through the installation of 1,800 kva. in static condensers. That company was faced with the condition of a generally low system power factor and after a careful analytical study of its situation decided that the expenditures necessary to effect the required correction of power factor on the premises of several of its industrial consumers was more than amply justified and of sufficient advantage to the power company to warrant the job being done at its own expense.

The Grays Harbor Railway & Light Company serves Aberdeen, Hoquiam, Cosmopolis and surrounding territory in Grays Harbor County and has a comparatively heavy industrial load with an average daily load factor of 65 per cent. Most of the load consists of lumber mills and allied industries and also those industries furnishing and supplying repair parts and supplies for logging camps. These mills cut fir, hemlock, spruce and cedar, and in order to handle the heaviest load with comparative ease most motor ratings are above the requirements for normal operation. Induction motors seem to be peculiarly adapted to this particular kind of work and their application under these conditions naturally has resulted in power factors ranging from 45 to 60 per cent. These loads are supplied by three-phase, four-wire, 4-kv. feeders each equipped with three single-phase regulators. In general these feeders supply lighting as well as power service because there are no purely power feeders. These feeders are either 4/0 or 2/0 copper and radiate directly from the company's Electric Park steam-electric plant. Feeder lengths range from 2½ to 6 miles to the load centers.

* Abstracted from a paper presented by Mr. Hill to the Seattle Section, A.I.E.E.

Initial Cost Calculations

A study of the several important factors relative to the comparative merits of synchronous condensers and capacitors was made. Calculations were based upon 2,000 kva. as a size necessary to bring the existing power factor up to 80 per cent. With respect to first cost the synchronous condenser had the advantage with a cost of approximately $5 per kva. as compared with $17 per kva. for capacitors. Based upon 2,000 kva. the total first costs would be $10,000 for the synchronous condenser and $34,000 for the capacitors, $24,000 in favor of the former. However, in this particular case the installation of a synchronous condenser required an addition to the power house building which would tend to offset the advantage just mentioned.

From the point of view of internal losses the capacitor with losses of 0.25 per cent is vastly superior to the synchronous condenser with losses of from 3 to 4 per cent. Using 2,000 kva. as a basis the losses are 5 kw. and 78 kw. respectively. For 24-hour operation the annual losses would be 43,800 kw.-hr. and 683,280 kw.-hr. respectively. The difference, 639,480 kw.-hr., if valued at 5 mills per kw.-hr. would give an annual saving in favor of the capacitors of $3,197.40.

Careful computations indicated the possibility of an annual saving of 500,000 kw.-hr. in feeder line losses by installing capacitors, a saving not possible with a synchronous condenser. Evaluating this at 5 mills gives an additional saving of $2,500 in favor of the capacitors as compared with the synchronous condenser. Thus the calculated total annual saving amounts to $5,697.40. This amount capitalized at 15 per cent is $38,000. In other words, based on savings in internal losses and line losses it was economical to pay $38,000 more for the capacitors than for the synchronous condenser, whereas the actual difference in price was only about $24,000. These figures giving expected operating efficiencies, together with the expectation that capacitors located out on the lines would increase the capacity of the feeders in addition to lowering the load on the generator influenced the ultimate selection of capacitors for the job.

Check tests indicated the advisability of installing six 300-kva. capacitor units, four of them rated at 440 volts for installation on the secondary sides of industrial transformer banks and two rated at 4 kv. for installation directly on 4-kv. feeder circuits where this corrective influence would be felt back to the power station. The particular two 4-kv. circuits considered have many small power installations scattered throughout their lengths.

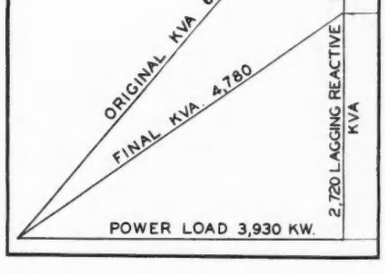


Fig. 2. A 440-volt capacitor installation in a lumber mill yard on the low side of the local power transformer bank. A protective fence since his been placed around this equipment.

Installation and Operation

Installation of capacitor equipment is quite an easy matter. It can be placed on suitable racks, on poles or in a mill yard at a reasonable cost. The figures given on installation costs included the pole structures, the raising of the steel racks and outdoor casings, the assembling and connecting of the 5-kva. units which compose the completed 300-kva. capacitors, and connections to the primary or secondary lines. Slightly more time was consumed in connecting up to 440 volts due to handling heavier wire.

A typical 4-kv. installation on poles is shown in Fig. 1, while in Fig. 2 is shown a typical 440-volt installation where space was found on the heavy timbers under the pole rack near the transformers. Since that time a fence has been constructed around this capacitor to keep the youngsters away. This is located in the yard of an industrial plant where space was available.

The capacitor installation was completed in September, 1927, and consequently no long-time operating data are available as yet. Nevertheless, it was possible to carry 1,600 kw. more peak load during that fall than was possible the previous year and on the same 5,000-kw. generator. The following comparative data show with entirely acceptable accuracy the conditions before and after the installation of the 1,800 kva. in capacitors:

	Nov. 23, 1926	Nov. 22, 1927
D.c. volts	108.1	85.8
D.c. amp.	335.0	289.0
A.c. amp. per terminal	845.0	667.0
Indicating wattmeter	3,900.0	3,930.0
Integrating wattmeter	3,610.0	3,540.0
Kva.	6,060.0	4,780.0
Power factor, per cent	64.4	82.1

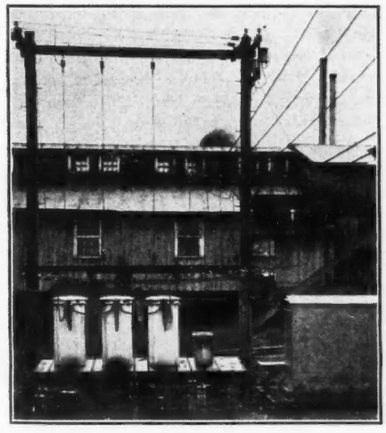


Fig. 3. Vectorial depiction of system power factor correction effected by capacitor installations at or near consumer's premises.

These data are the average of sixteen hours' run on the two days noted and hence are fairly representative of operating conditions. The calculations also are based upon a 16-hour day since normal operation is to shut down the steam plant between midnight and 7 a.m., allowing the load to be carried on the other turbine-generators which are installed in two sawmills.

The vector diagram shown in Fig. 3 and prepared from values in the foregoing table gives a clear picture of the corrective results obtained. It may be seen that under the original conditions with an energy load of 3,930 kw. the original kva. was 6,060 with 4,620 lagging reactive kva. at 64.4 per cent power factor, whereas the final kva. with an energy load of 3,930 kw. was 4,780 while there was only 2,720 lagging reactive kva. load at 82.1 per cent power factor, showing 1,900 kva. corrective effect. Since 1,800 kva. of corrective equipment was installed, the calculations referred to are reasonably accurate when considering that the readings used for calculation were normal hourly readings taken by the station operator. And also it must be remembered that the amount of corrective kva. furnished by the capacitors to the system varies directly as the square of the voltage applied and therefore, while the normal rating of the capacitors installed is 1,800 kva., the corrective kva. may vary considerably depending upon the voltage at the capacitors.

In calculating the I^2R loss in the 5,000-kw. generator using the average figures in this table and the resistance of the generator as furnished by the manufacturer, we find the losses to be 36.629 kw. in 1926 as compared with 22.822 kw. in 1927, or a saving of 13.80 kw. On a basis of sixteen hours' operation and 300 days a year this saving amounts to 66,283 kw.-hr. In calculating the I^2R loss in the d.c. generator under the same conditions we find the loss in 1926 to be 3.456 kw. and that in 1927 as 2.726 kw. or a saving of .730 kw. On the same basis of operation this amounts to 3,504 kw.-hr. per year. The motor on this exciter was not taken into consideration. The energy required for generator excitation after the capacitor installation also showed an appreciable reduction, a saving amounting to 54,801 kw.-hr. per year.

Calculations on the five feeders to which these capacitors are connected based upon readings of station recording instruments with and without the capacitors on the line indicate a saving in I^2R loss of 500,000 kw.-hr. per year. These various savings amount to 624,588 kw.-hr. per year, as follows:

	Kw.-hr.
5,000-kw. generator I^2R loss	66,283
50-kw. exciter I^2R loss	3,504
50-kw. less excitation required	54,801
Line losses	500,000
	624,588

Assuming a busbar cost of $0.005 per kw.-hr., this saving amounts to $3,122.74. Since most of this saving is due to a reduction in line losses, the unit cost of $0.005 per kw.-hr. assumed is exceedingly conservative. Considering the $31,500 installed cost of the capacitors, the savings noted represent a return of 10.1 per cent on this investment and this does not include the capital saving effected by obviating the necessity of replacing the formerly overloaded industrial transformer banks and other such economics directly traceable to improved power factor.

Further, an effective load increase averaging 1,300 kw. has been possible on the 5,000-kw. generator. Figuring the entire capacitor cost in terms of increased effective generator capacity shows a cost of only $24.25 per kw., a most attractive figure for generation capacity. From another angle, the aforementioned $3,125 annual saving in reduced losses represents 15 per cent on an investment of $20,800. Subtracting this amount from the cost of the

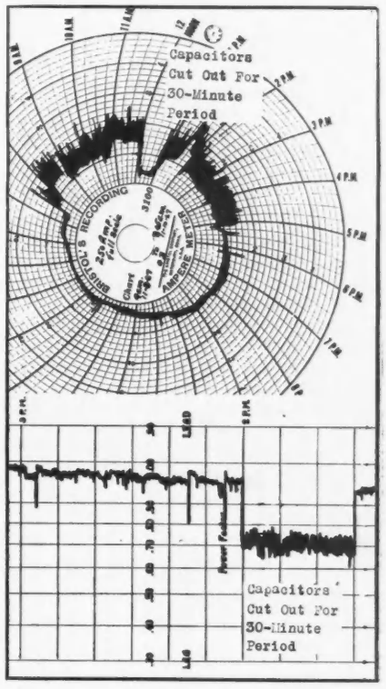


Fig. 4. Meter charts showing effect of capacitor installation on a 4-kv. feeder serving a highly fluctuating mill load. (See Case 1 in text.)

capacitors, $31,500, $10,700 of investment is found to be not covered. It is logical to consider that the 1,300 kw. of increased effective generating capacity as well as the added transformer and regulator capacity was obtained for this $10,700, or at a cost of only $8.23 per kw.

Corrective Results

As previously stated, checks were made of the power factor on the several 4-kv. feeders and these were followed up by tests on the premises of consumers supplied by these feeders. From these data we were enabled to select the locations of the worst conditions and determined definitely the size of capacitors to be purchased and placed at these locations. After the capacitors were in operation a series of tests was made on each feeder at the power station with recording meters. It was convenient to make these tests only for half-hour periods which, considering the highly fluctuating characteristics of the feeder loads, did not lend great accuracy to the tests. However, the tests were made mainly to obtain a record that would show with reasonable accuracy just what were the actual

effects of the capacitors. Specifically, the results noted were as follows:

CASE 1—300-kva. capacitor on 4-kv. line. Meter charts showed line current reduction of 30 amp. per phase, power factor increased from 65 to 87 per cent, and lagging reactive load decreased 215 kva. The sawmill load on this feeder is heavy and fluctuates greatly and consequently the half-hour check test shows less reduction in reactive kva. than probably would have been shown over a longer test period.

CASE 2—300-kva. capacitor on 440-volt side of a bank of transformers serving miscellaneous power customers and also serving part of the business district of

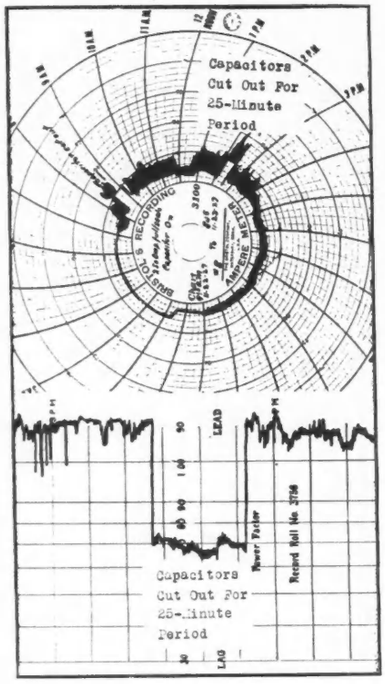


Fig. 5. Meter charts showing effect on long lightly loaded feeder where 300-kva. capacitors are installed on 440-volt side of consumers' transformer bank.

Hoquiam, Wash. Test made on a dark day when the percentage of high-power-factor electric light demand was high compared with a normally bright day. Test (15 min. only in this case) showed current reduction of 30 amp. per phase, power factor improvement from 77 to 94 per cent, and a reduction in lagging reactive load of 215 kva.

CASE 3—A long, fairly lightly loaded 4/0 feeder with capacitor installed on 440-volt side of consumer's transformer bank. Current reduced 32 amp. per phase, power factor shifted from 68 per cent lagging to 90 per cent leading, and lagging reactive load reduced 220 kva. Resulting high voltage corrected by shifting transformer taps.

CASE 4—300-kva. capacitor on 440-volt feeder supplying a sawmill with all light and power demands. Test showed current reduced 60 amp. per phase, power factor shifted from 70 to 92 per cent, lagging load corrected to the extent of 430 kva. The current reduction in this case was 60 out of a former total of 175.

Of course, it goes without saying that extreme care should be exercised in installing capacitors on unregulated feeders.

Summarizing, savings have been made in power losses amounting to a return of 10.1 per cent on the total investment, the peak capacity of a 5,000-kva. generator has been increased by 1,600 kw., or 45.7 per cent over conditions prevailing a year ago, the capacity of all of the feeders on which the capacitors are installed has been increased, and the load on feeder voltage regulators has been reduced, resulting in increased range of the regulators, higher voltage to the consumer, which means higher bills with a more satisfied consumer due to better operating conditions resulting in increased output.

Although it usually is considered that the consumer should correct his own

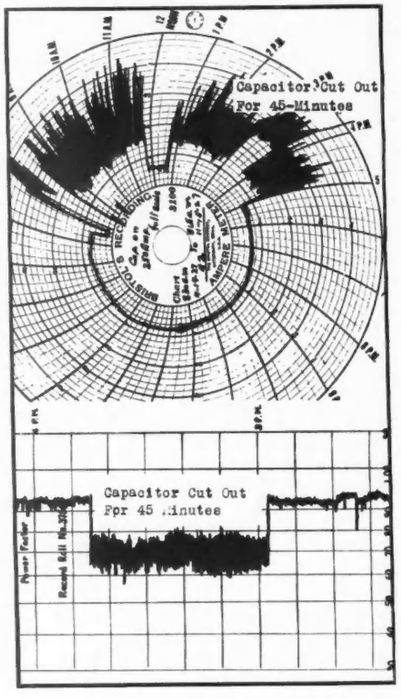


Fig. 6. Meter charts showing effect of 300-kva. capacitors on 440-volt side of bank serving lumber mill with total light and power requirements.

power factor and be given a bonus for so doing or else be penalized for not so doing, the experience of this company is an excellent example of the profit to be gained by the central station in making this correction right on the consumer's premises. The figures used in calculating corrected lagging reactive kva. and the unit cost of $0.005 per kw.-hr. for power saved in line losses certainly are conservative, but at the same time show sufficient justification for the installation.

Protector Keeps Switch Stick Dry and Safe

By H. H. BUELL, Superintendent Electric Distribution, Pacific Gas and Electric Company, San Jose, Calif.

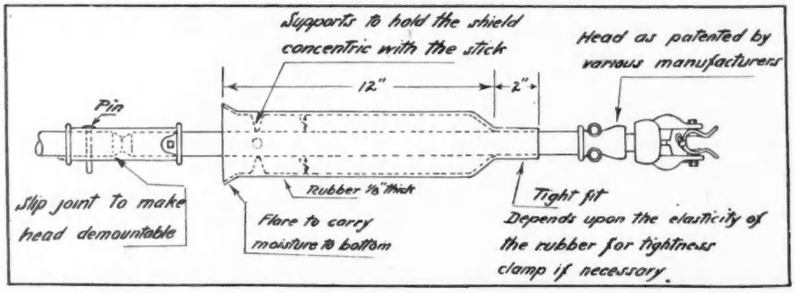
A very useful and simple protector for an 11-kv. fuse stick is shown in the accompanying illustration. Such fuses are being handled at present by means of a number of different designs of fuse pullers. These fuse pullers consist of a head which is intended to grasp the fuses, the head in turn attached to an insulating handle or stick. The latter in most cases is a round wooden rod about 6 ft. long and is treated in various ways to prevent absorption of moisture.

During ordinary weather the handling of fuses by means of these fuse pullers is a comparatively simple and safe procedure. However, in rainy weather such is not the case. Even a comparatively gentle rain causes moisture to collect and run down the stick to the operator's hands and makes a more or less conductive path for the flow of electricity.

Often the operator is required to use rubber gloves to increase his insulation, but many cases are known where the operator has received a very severe shock in spite of all these precautions. In some cases this condition has made it impossible to pull the fuse.

The shield shown in the accompanying sketch was designed to keep a small section of the stick comparatively dry and to break the flow of water along the stick. Two very necessary requirements are met by this shield: it is light in weight (the fuse puller itself is just about all a man can handle safely on a pole) and it is neat and compact. Several other designs were considered and tried out, but they were too heavy and too large. Detachable shields were considered undesirable.

Design details are largely self-explained in the accompanying sketch. The shield was mounted and vulcanized on a wooden mandrel by a local rubber concern. It may be noted that the patented head, together with a short section of the stick and the shield, is detachable from the remainder of the stick. This permits the operating part of the stick with the shield to be carried separately in a small metal container with a tight cover in an upright position on the trouble car so that it always is dry except when actually in use.


Supports to hold the shield concentric with the stick
Head as patented by various manufacturers
12"
2"
Pin
Slip joint to make head demountable
Flare to carry moisture to bottom
Rubber 1/8" thick
Tight fit
Depends upon the elasticity of the rubber for tightness clamp if necessary.

Details of device which keeps a section of stick absolutely dry even in the wettest weather.

Two 30,000-Barrel 168-Ton Fuel Oil Tanks Moved 825 Feet by Floating

THE moving of two 30,000-bbl. steel oil storage stanks a distance of more than 800 ft. was one of the jobs incident to the construction of the new Long Beach No. 3 steam-electric generating station of the Southern California Edison Company which now is nearing completion. As shown in the accompanying illustrations, the moving job was accomplished with a minimum of labor and equipment, to say nothing of cost, by floating the tanks from their old location to the new. Sand dikes were built up to provide a series of pools upon the surface of which the tanks were floated.

As the weight of the tanks caused an upward thrust of 57.6 lb. per sq.ft. on the comparatively thin and unsupported bottom of the tank, it was necessary to brace the floor plates against this upthrust to prevent collapse of the tank. Further, it was necessary to support the roof columns to prevent these columns from punching through the floor. Both the upward thrust on the bottom of the tank due to the hydraulic lift corresponding to the weight of the tank and also the weight of the roof through the roof columns had to be transferred to the side walls. To accomplish this transfer of stresses a special timber truss was built inside of the tank and designed to transmit all thrust to the sides of the tank. These trusses consisted chiefly of 12 x 12-in. and 12 x 14-in. timbers placed radially on the tank bottom with inclined braces carrying the thrust directly to the walls. Thirty-six of these radial timbers were used for each tank.

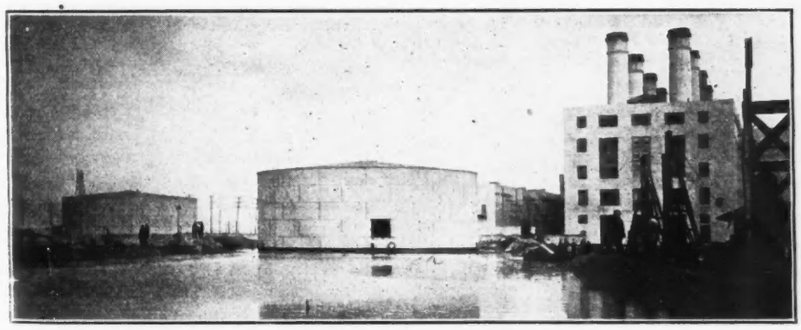
Second tank about ready to proceed upon the last half of its journey to new foundation.

vertical thrust at the outer ends of the radial beams directly to the tank walls.

As may be noted in the accompanying illustrations, a small section was removed from one side of the tank to permit easy access to the interior for men and material. To reduce the danger of slipping the interiors of the tanks were thoroughly cleaned with steam prior to the construction of the timber trusses within the tanks.

Dikes were constructed by means of scrapers and clamshell buckets and sea water was pumped into the enclosures. The draft of each tank with its loading of bracing was not more than 11 in., but because of the uneven nature of the ground surface the actual depth of water was more than double this. The tanks floated on an even bottom and guide ropes fastened to the sides and to the rear controlled the direction of travel and served to balance against wind pressure.

The second tank to be moved traveled 825 ft. from the old location to the new and which was moved some 1,000 ft., section by section, and incorporated in the safety fire wall for the new locatoin of the tanks.



First tank on its way along artificial channel.

Column and roof loads were transferred to the radial timbers through two concentric rings of 12 x 12-in. beams connected to the columns by means of timber clamps. The inclined braces from the outer concentric ring of timbers were fitted under clip angles in the third circumferential band of rivets and from the inner ring the braces extended to the clip angles supporting the rafters at the top of the tank walls. The longer braces were side braced to prevent buckling under load. Upright timbers and clip angles transmitted the

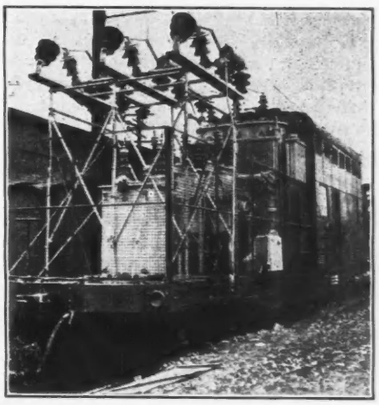
in a total time of 6¾ hr. The tanks were 86 ft. in diameter, 30 ft. high and weighed 168 tons gross, including the timber bracing. The job was done for the Southern California Edison Company by the construction crew of Stone & Webster, Inc., under the general supervision of S. L. Shuffleton, Western manager.

On page 614 of the June 1, 1928, issue of Electrical West were presented the details involved in the moving of 1,300 ft. of fire wall which surrounded these storage tanks in their original location

Portable Railway Substation Is Fully Automatic

By A. VILSTRUP, British Columbia Electric Railway Company, Ltd., Vancouver, B. C.

Chiefly for emergency service in the Fraser River Valley, but also to be used wherever else it may be needed, the B. C. Electric Railway Company has added to its substation equipment the automatic portable substation shown herewith. The station takes its energy at either 11.5 kv. or 33.5 kv. from transmission lines paralleling the right-of-way and will supply two outgoing 600-volt positive feeders.



Portable automatic substation.

The substation consists of high-tension disconnecting switches and oil circuit breaker, 1,100-kva. step-down transformer, 1,000-kw. synchonous converter, and switchboard for full automatic control of all machinery and the two d.c. railway feeders. All of this equipment is mounted on one flat car.

Foreman Training—Those who are directly interested in this most important problem will do well to look up the April, 1928, issue of Mechanical Engineering, the monthly journal of the A.S.M.E. In that issue there are two papers, "Improvement of Foremanship by the Conference Method," and "Education for Foremanship," which give information on the subject from two competent authorities.

Analysis of Current Transformer Tests—XV

General Summary of Important Points and Index of Series

By E. C. GOODALE, Tacoma, Washington

THE outstanding importance of metering and relaying problems in the economic production and satisfactory distribution of electric power has placed in a more important position those men charged with installation and maintenance of such equipment. An understanding of at least some of the more important functions and characteristics of instrument transformers obviously will aid meter and relay men in conducting their work. With this in mind the foregoing series of explanations of laboratory tests was prepared.

In summary the following points should be noted particularly:

1. Vectors may be added or subtracted by arranging them in a heel-and-toe order at their proper slopes and at their proper scales, reversing direction for a subtraction. The resultant vector sum is, to scale, the straight-line vector from the start or heel of the first to the finish or toe of the last.

2. Before starting to figure values, particularly when dealing with vector quantities, first draw a complete connection diagram of the connections in question and on it note all the essential data which already are known, such as transformer polarities, numerical values of volts and amperes, etc.

3. Indicate the directions of the unknown as well as known quantities by direction arrows. If desired a specially shaped arrow may be used for each different kind of quantity, such as open-headed for voltage, solid-healed for current, diamond-headed for flux, etc. This is desirable so that at a glance one may tell the direction of the quantity in question. Label these quantities with any subscript letters desired, voltage usually being termed E_1, E_2, etc., and current I_A, I_B, etc. The directions will have to be assumed in most cases.

For single-phase connections the best assumed directions for current are from the source to the load, down through the load and back on the other conductor. Induced voltage and voltage-drop arrows will oppose those of the current flow except in a source and in certain parts of autotransformers.

For 3-phase connections the source voltages are best assumed heel-and-toe if delta-connected, or from neutral to line if star-connected. Line currents are best assumed all going from source to load. Load currents assumed from line to neutral if star-connected, or from line to line if delta-connected, in the direction corresponding to that in which they would flow if they were single-phase loads supplied by a single-phase source, composed of their two source conductors in each case. Load voltages in delta or star are best assumed in a direction opposite to that of the current. They then agree with the assumed directions of the source voltages, the heel of the direction arrow at assumed low potential and the toe at assumed high potential.

4. With the connection diagram fully drawn and labeled, start the vector diagram. For single-phase connections it is as well to assume the line voltage horizontal and pointing to the right (at 0 deg.). All other quantities will then be plotted at their proper angles with respect to this voltage. For 3-phase computations any of the three voltages may be assumed horizontal and to the right, if desired, and all others at their proper angles with respect to it.

Accidents Cost—

The lost time of the injured employee.

The lost time of other employees:
- **Due to curiosity.**
- **Due to sympathy.**
- **Due to assisting injured party.**
- **Incident to shattered nerves.**

The lost time of the foreman:
- **In assisting injured employee.**
- **In investigating accident cause.**
- **In arranging for injured person's work to be done by others.**
- **In selecting and breaking in a new employee.**
- **In preparing reports and attending hearings.**

Time spent by first-aid and hospital staff.

Machine damage and spoilage of material.

Interference with production.

Loss of profit on productivity of injured employee.

All of this in addition to the cost in terms of compensation and the immeasurable cost of human suffering.

—Prevention Pays!

5. Progress with the vector diagram by putting on it all known data, such as 120 deg. relationships between 3-phase voltages or currents, and 90 deg. relationships between induced voltages and their magetizing currents, or in-phase relationships between resistance drops and the currents causing them.

In all cases in which there are no demagnetizing ampere-turns—there are in transformers and autotransformers—the entire current passing through a pure inductive reactance is magnetizing current. In a transformer with open-circuited secondary the current which the impressed voltage is able to force through it is all exciting current, this being the same as magnetizing current plus the core-loss current.

Complete the vector diagram by determining the unknown quantities and placing them on it. The unknown quantities may be determined by the use of Ohm's law, Kirchoff's laws, and the power and transformation laws, using each in its proper place.

To determine the unknown currents in a load, use either Ohm's law: $I = \frac{E}{Z}$ where Z is the total impedance upon which the voltage E is impressed, or the modfiication of Kirchoff's law. The latter states that the current entering a junction point equals the vector sum of the current leaving minus any other currents entering. Also it states that the current leaving a junction point equals the sum of those entering minus any other currents leaving.

To determine an unknown voltage use Ohm's law: $E = I \times Z$, where I is the current flowing through impedance Z across which voltage E is impressed. Or, use the modification of Kirchoff's voltage law: that the voltage between any two points on an electrical system may be determined by progressing from the one point, assumed at the lower potential, to the other, assumed at the higher potential, by any known route and vectorially adding when the direction of the induced voltage or voltage drop agrees with the direction of progression and subtracting when it opposes the direction of progression.

If data still are lacking and none of these methods may be used for their determination then assume enough data so that the diagram may be completed in whole or in part, re-checking by means of the laws to see how nearly correct the assumption was. If correct, all the laws should check out on the various parts of the connection to which they may be applied. If they do not check out correctly, re-assume values until they do check out.

The power law may be used in any part of an electrical system upon which a fundamental a.c. voltage is impressed and in which fundamental alternating currents are flowing. It states that the power in watts consumed in any part of any electrical circuit upon which a fundamental voltage is impressed is equal to the product of the voltage impressed multiplied by the "power component" of the current. The power component is the projection of the current vector upon the line of the voltage vector. The power law as well as the other laws hold as well for harmonic currents as for the fundamental, their vector values rotating at multiples of the frequency of the fundamental vectors.

The transformation law may be separated into a number of parts. The most fundamental are the following two, the others being derived from them: (a) The voltage induced per turn of conductor in any transformer or autotransformer is the same for all turns interlinking with the same flux. That is, when all the flux interlinks all the turns. (b) For a common magnetic core the total primary ampere-turns are equal and opposite, in the direction of their action on the core, to the

vector-sum of the total secondary turns plus the magnetizing ampere-turns.

EDITOR'S NOTE: This is the final article of the series prepared by Mr. Goodale and dealing with current transformer tests. A series of articles dealing with "reactive metering" has been prepared by Mr. Goodale and will appear in ELECTRICAL WEST in the near future.

Index of Goodale Series

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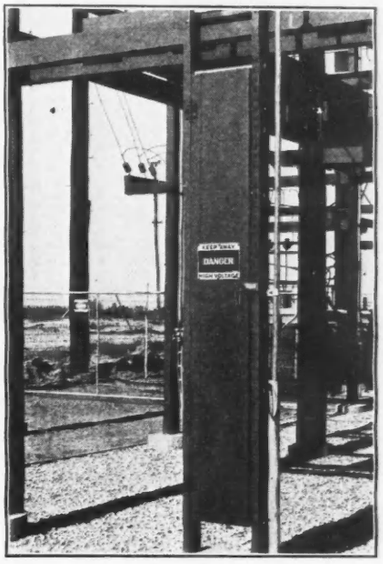
Part XIV—Outline of Autotransformer and Current Transformer Combinations—Aug. 1, 1928, p. 86.

Ladder Safety Door Warns Against "Hot" Lines

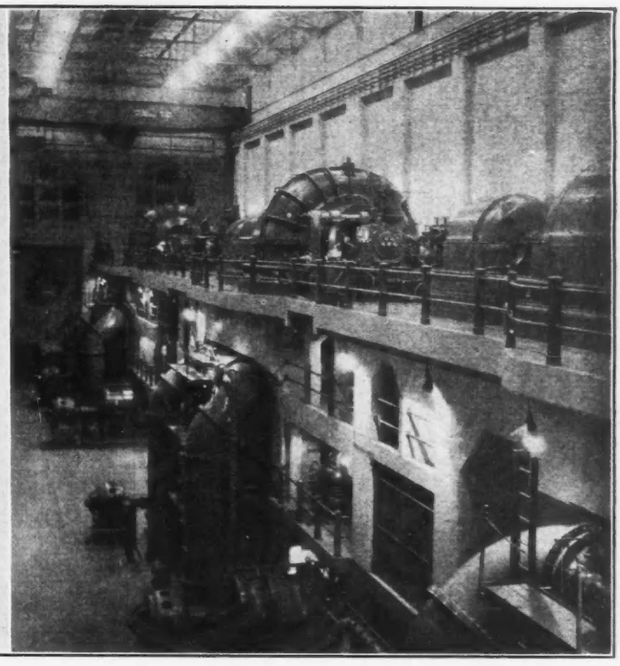
This is one of the many applications of a safety door for ladders devised by the engineering department of The Southern Sierras Power Company, Riverside, Calif. The ladder door which is shown here in a closed position makes it impossible to climb the ladder from either side. Blocks are mounted on the back of the door which fit snugly between the rungs.

This particular installation is at the Calipatria substation of The Southern Sierras Power Company in the Imperial Valley, and since this is an attended substation the ladder is not kept locked, but is kept closed under normal conditions as a definite warning against ascending into "hot" equipment above. At certain unattended substations it is the practice to connect these ladder doors with the operating mechanism of the main-line switches so that the ladder door is closed automatically whenever the line switch is closed. This is an inexpensive and very effective safety device.



A safety ladder, impassable with the door closed.

An Example of Modern Steam-Plant Housekeeping



The accompanying two night views of the Long Beach No. 2 steam plant of the Southern California Edison Company give an excellent indication of what may be accomplished by definite and rigid "housekeeping" routine in a modern steam plant. Time was, and in some cases still is, when a steam plant was accepted as inevitably dirty. However, since steam-electric generation has developed to a basis of scientific operation with thoughtful and well-founded attention given to studies that lend definitely greater operating efficiency to the plant, it has been realized that only by keeping a plant in absolutely top-notch appearance and condition can the morale and efficiency of the personnel be kept up where it should be kept. The view at the left shows the main aisle in the boiler room of plant No. 2 of the Edison company under normal operating conditions. Rubber mats are provided along natural traffic lanes and the floor between these runways is kept washed, waxed and polished. This and other features of careful housekeeping have worked wonders not only in plant appearance, but in personnel morale and efficiency. The view at the right shows the turbine room which also is kept up meticulously.

-FIG. 1-
Larger Wattmeter Reading - W_1 -
Power Factor
+ Ratio
- Ratio
Power Factor Determination
Ratio-Wattmeter Method
Locate points on the outer scales corresponding to readings of the two wattmeters. Connect these points with a straight-edge. Intersection with center scale gives indication of power factor.
Smaller Wattmeter Reading - W_2 -
-FIG.3-
Watt Hour Constant - K_h -
Load in K.W.
Load in H.P.
Watthour Meter Load Determination
Intersection with center scale of line between proper meter points on outer scales gives figures corresponding to meter load.
Meter Disc R.P.M.
+ W_2 Scale
- W_2 Scale
Power Factor from Smaller Wattmeter Reading
Power Factor from Total Power - W_1 + W_2
Power Factor Axis
W. Scale
Power Factor from Larger Wattmeter Reading
E x I Scale
Power Factor Determination
Volt-Ampere Method
Locate point on right-hand scale corresponding to reading of meter to be checked. Then locate point on center scale corresponding to product ExI, and connect these two points along a straight-edge and project the line to the left to the Power Factor Axis, thus locating a point on that axis. A horizontal projection from this latter point to the proper adjacent scale (selecting the scale to correspond with the meter whose reading was used on the right-hand scale) gives the power factor in question.
Watts Scale
-FIG. 2-

Charts for Determination of Power Factor and Field Check of Meters

By C. F. DALZIEL, Santa Maria, California.

WHERE the 2-wattmeter method of power measurement is utilized there recurs the question of determining the proper sign (plus or minus) to be attached to the readings. A ready means of checking the correct sign has been found to be of great advantage, and the nomographic charts shown on the facing page have been found to serve this purpose well.

The use of these charts is best explained by typical problems from data observed in actual load tests. Take for example a case where the terminal voltage $E = 220$ volts, line current $I = 5$ amp., larger wattmeter reading $W_1 = 700$ watts, smaller wattmeter reading $W_2 = 400$ watts, and where it is the sign of the smaller wattmeter reading which is in question. This sign is determined by using the larger wattmeter reading W_1 on Fig. 2. As the power factor has been laid out on what may be termed a unit basis, the observed values of the problem may be reduced (to suit scale limits) by a common multiplier or divisor, accordingly mark W_1 on the W scale at 7 and EI on the EI scale at 11, and draw an index line, or lay a straight-edge from these points to the power factor axis. The power factor is read by projecting this point on the power-factor axis horizontally to the W_1 power-factor scale and gives about 16, indicating that the sign of W_2 is minus since the power factor is less than 50 per cent.

For check, also use the smaller wattmeter reading to determine the power factor. Place W_2 on the W scale at 4 and EI at 11 on the EI scale as before and draw the index line or lay the straight-edge from these points to the power factor axis, projecting from the point of intersection with the power factor axis to the W_2 power-factor scale. This gives about 15 for the power factor and checks the former method. As a final check, the total power may be used to determine the power factor, since the sign of W_2 is known to be negative. Place W on the W scale at 3 and EI on the EI scale at 11, note the intresection of a line through these points with the power-factor axis and project this intersection point horizontally to the total power scale. This gives the power factor at about 15.

To compute the power factor from the ratio-wattmeter method, Fig. 1, and supposing that the sign of W_2 is known already from conditions of the test, place the larger wattmeter reading on the W_1 scale at 70 and the smaller wattmeter reading on the W_2 scale at 40 (dividing actual values by 10 to permit ready use of chart.) An index straight-edge between these points will indicate a power factor of about 15 on the negative scale. This gives a fair check on all methods of determination.

Exhaustive use of these charts has shown consistently close check on power-factor values computed by the different methods, as just described. Experience has shown that any appreciable discrepancy warrants an investigation. Due to irregularity of the various scales, inspection of the charts will show which scale gives the greatest precision and consequently which should be used in order to derive the most reliable results.

Load Determination

The same general scheme may be applied to the solution of the familiar watthour meter load equation

$$K = \frac{3.6 \times Kh \times R}{T}$$

where Kh is the watthour-meter constant and R is the number of revolutions of the meter disk in T seconds. The chart for this is shown on the facing page, Fig. 3. To use this chart, locate on the right-hand scale a point corresponding to the speed in r.p.m. of the disk, and locate on the left-hand scale a point corresponding to the constant of the meter. Connecting these two points with a straight-edge will give a point of intersection with the center scale which is calibrated both in kw. and in hp. The scales are laid out on a logarithmic basis and hence any value or scale unit may be changed by a power of 10 if due allowance is made in locating the decimal point in the answer.

NEW BOOKS
for the Engineer

OVERHEAD ELECTRIC POWER TRANSMISSION ENGINEERING, by Wm. T. Taylor, London, Chas. Griffin & Company, Ltd.; J. B. Lippincott Company, Philadelphia; 527 pages; 70 illustrations; 91 tables. Price $17.50.—This work contains a most valuable collection of data collected by the author from all over the world, much of it reduced to tabular and graphical form. The author covers economic design, construction, operation and maintenance features in a well chosen manner. Line survey and location, conductor characteristics, stress, temperature, sag, telephone lines, steel and wood pole lines, insulators and costs are treated in detail. In spite of the presentation from the viewpoint of the English engineer, the book should be a valuable addition to the library of anyone closely interested in electric power transmission.

PROBABILITY AND ITS ENGINEERING USES, by Thornton C. Fry, Ph.D., Technical Staff of Bell Telephone Laboratories, Inc. Published by D. Van Nostrand, 8 Warren St., New York, 1928. Cloth; 476 pages; 49 illustrations; tables in appendices. Price $7.50.—Probability, as a subject, has been considered largely a matter of interest only to insurance organizations. However, an understanding of the subject undoubtedly is essential in certain branches of engineering activities and would be of material assistance in many others. The text is the outgrowth of lecture courses prepared by the author for use in the Bell Telephone Laboratories and the Massachusetts Institute of Technology. It is a highly mathematical treatise, as it must be to deal with a subject fundamentally mathematical. The duscussion is developed in logical steps and numerous typical examples are treated.

MATTER, ELECTRICITY AND ENERGY, by Walter Gerlach, University of Tubingen, translated from second German edition by F. J. Fuchs, Ph.D., St. John's College, Brooklyn, N. Y. Published by D. Van Nostrand Company, 8 Warren St., New York. Cloth; 6 x 9 in.; 427 pages; 119 illustrations; numerous tables. Price $6.—This work embraces a series of closely related and interdependent lectures, each of which itself constitutes a complete unit. It is designed to appeal to the chemist, the minerologist, the technical physicist, to the engineer, and to the student of natural science. It is obvious that this book can constitute only an introduction to the developments and advances of the past decade, but as such it should serve well.

THE A.C. COMMUTATOR MOTOR, by C. W. Oliver. Published by D. Van Nostrand Company, 8 Warren St., New York, 1927. Cloth; 6½ x 10 in.; 281 pages; 184 illustrations. Price $7.50.—According to the author his main object in writing this book is to attempt to break down the popular prejudice against a.c. commutator motors. The author maintains that the a.c. commutator motor in combination with induction motors offers a most logical solution to the problems of speed regulation, high power factor and flexibility in the handling and operation of motor-driven equipment. In the first part of the book there is a general analytical discussion of the theories underlying such motors. The second part of the book is given over to practical application. The work is written from the British point of view, of course, and deals with British and European practice in motor application, both for factory and industrial uses and for railway purposes, but the information it contains should be of value to all those interested in motors.

TRANSMISSION LINE ENGINEERING, by W. W. Lewis, transmission engineer, central station engineeing department, General Electric Company. Published by McGraw-Hill Book Company, 370 Seventh Ave., New York. First edition, 1928. Cloth; 6 x 9 in.; 369 pages; 79 tables; 200 illustrations. Price $4.—In this volume are discussed those problems considered by the author to be the more important electrical problems that concern the engineer engaged in transmission line design. The formulas have been derived from original sources and are believed to be authentic. Numerous examples are given and discussed and in general the text is designed with a view to making it of service not only to practicing engineers, but also as a text for engineering schools and colleges. The book presents the basis upon which it is possible to calculate all of the necessary constants of a transmission line.

ELECTRIC HEATING, by E. A. Wilcox, E. E., consulting engineer, San Francisco. Published by McGraw-Hill Company, New York. First edition, 1928; 469 pages; 152 illustrations; 133 tables, 5 x 7 in.; cloth bound. Price $5.—This book fills a long-felt need of published information regarding electric heating and presents authoritative data gathered by the author during twenty years of activity in the field of electric heating. The entire text is replete with information of unquestionable value to commercial executives, engineers, salesmen and others interested in extending and developing the use of electricity for commercial and industrial heating purposes. It gives a general perspective of the field.

INDUCTION MOTOR PRACTICE, by A M. Dudley, engineering supervisor of development, Westinghouse Electric & Manufacturing Company. Published by McGraw-Hill Book Company, 370 Seventh Ave., New York. First edition, 1928. Cloth; 6 x 9 in.; 125 illustrations. Price $2.50. For sale by Technical Book Shop, 883 Mission St., San Francisco.—Through this book a designing engineer makes available his experience to operating men, students and others interested in induction motor application, to help in the solution of practical problems involving induction motor characteristics. The book is a logical running mate for the author's "Connecting Induction Motors," and gives much useful and interesting information not related directly to a consideration of windings and connections. Facts are treated in simple language and without involvement incident to mathematical expressions. The text is divided into eleven chapters dealing progressively with subjects ranging from fundamentals to the circle diagram. The last chapter constitutes one-third of the book and is entitled "Question Box." It gives explanatory answers to many practical questions.

Ideas for the Contractor

Four-Wire Power Servicing for Old Buildings

Particular Features of the System Which Make It Valuable Where Space Is Limited and Power Needs Have Grown Beyond Original Installation

FROM the standpoint of economy and efficiency the new system of servicing, recently adopted in Los Angeles, should prove of interest to electrical contractors, inspection departments, power companies and consumers of electric power. The investment required for distribution equipment by the serving company and the consumer has been materially reduced. The new system also makes for economy of the installation space required for the housing of this equipment. This is a particularly valuable consideration in the rewiring or modernizing of installations made only a few years ago and since grown utterly inadequate.

The basis of this new system is the installation of a standard four-wire power service to buildings where consumers at any time may desire one or more of the following types of service:

110-volt single-phase power or heat.
220-volt single phase power or heat.
220-volt three-phase power or heat.

The main service switch is to be of the four-pole type, or such size as to handle the total connected load. Power leg and neutral are to be installed as per serving company standard, namely, three-phase leg in center position, non-fused neutral on outside. This does not prevent the neutral wire from being made of smaller size than the other conductors. Neither does the new system prohibit the possibility of the inspection department granting a diversity factor on the installation where this may seem desirable. All three cables of the three-phase power are to be of the same size.

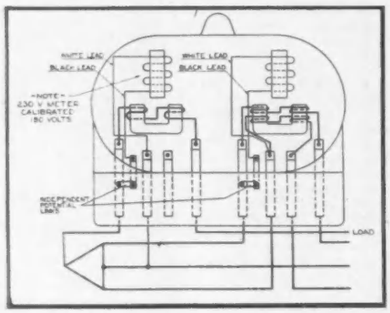


Fig. 2. Self contained watthour meter for 220-volt, three-phase power and 110/220-volt single-phase power, using four wires. Maximum capacity, 75 amp.

Metering Difficulties Met

To make the system of practical value to the consumer it was necessary to develop meter connections to the end that all of the customer's current consumption might be handled on one meter. This was accomplished by using a horizontal type of 3-phase watthour meter with a 5-amp. 2-wire element on one side and a 5-amp. 110/220-volt three-wire element on the other side. This may be accomplished with a vertical meter, but the horizontal type has many advantages from a testing standpoint, as the elements are connected only through the gear train.

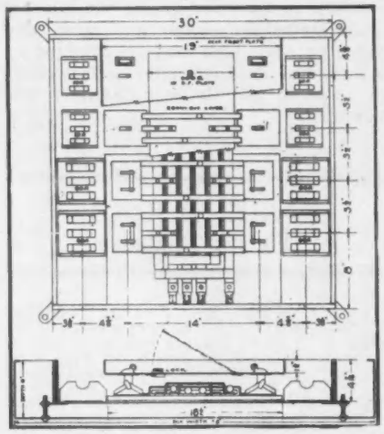


Fig. 1. Typical panel board designed for four-wire servicing such as the one used in the Bradbury Building.

Application of this metering arrangement will be limited to those of more or less stabilized nature. The meter must be made up and specially calibrated in the utility company's test laboratory for each load to be served, with meter elements, current transformers and gear trains adjusted to the amount of three-phase and single-phase load.

When either the three-phase or single-phase load is increased or decreased to an amount that would affect the accuracy of the meter, it must be changed to a type and size which will take care of the new load conditions. The meter formerly serving cannot be used again for any other installation except for a load almost identical with that for which it was designed and formerly served. Use of this special meter is desirable on office buildings, loft buildings and other loads which will remain more or less unchanged for a period of several years.

Due to the cost of making up this special meter and the inability to again use the various elements after the meter has been removed from service, except for some future load of the same amount, it cannot be used on loads requiring frequent meter changes due to changes in the connected load.

This arrangement sums up all energy on one meter register and will thus permit the consumer to earn the lowest rate. By the old system two meters were set and were billed separately at the starting steps of the rate. The new system combines the energy used on all classes of power service.

Maximum Demand Available

Another advantage to the consumer is that a true maximum demand on the mixed load can be had, by installing a single maximum demand attachment, thus permitting the utility to determine the maximum demand accurately and give accurate load factor discount. This will also eliminate the old system of allowing a combination of meter readings, where a separate meter was formerly installed for the serving utility's benefit. Where restrictions force the consumer to use equipment (entitled to power rate) that cannot exceed 150 volts to ground, such as irons, hand drills, etc., attached by a portable cord, the new metering arrangement combines the energy used by these devices, thus earning the lower rate.

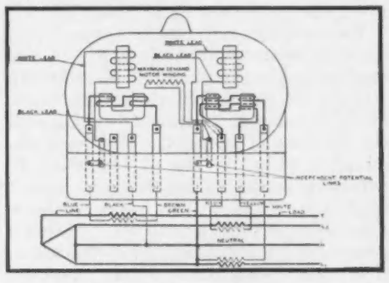


Fig. 3. Horizontal watthour meter for single and three-phase power on a four-wire circuit, with current transformers; any ratio primary to five-amp. secondary.

To the utility it means one service record, one reading sheet and one bill, instead of two of each of these, as was required under the former system.

For the Old Building

The greatest use found for this system, up to the present writing, has been in the older type of multi-storied building in the business section of the city. As the business section tends to move ever onwards toward new locations, the owners of some of these older buildings find themselves put to the necessity of accepting the so-called "loft" tenant, or small manufacturer. This class comprises the small maker of women's and men's garments, hats, ties, etc., who has a few sewing machines, several electric pressing irons, and sundry smaller electrical devices.

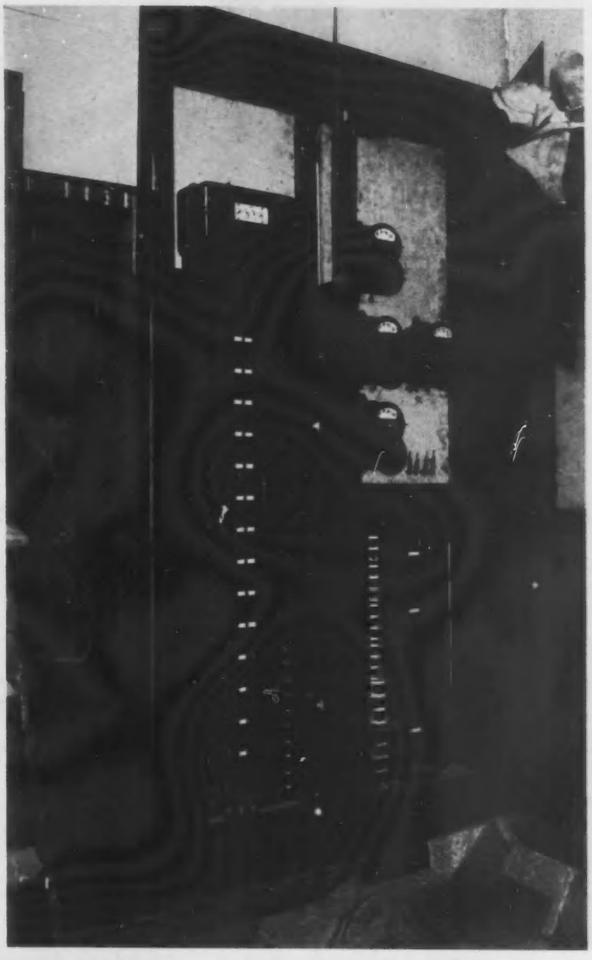
Owing to the increased cost to the utility of supplying direct current, the rate for it has the growing tendency of restricting its use. These small manufacturers usually have purchased alternating current motors, either of the single-phase or three-phase variety. As most of the older type of Los Angeles office buildings were originally wired for direct current, supplied by an isolated plant in the building or by a public utility, it has in many instances been impossible to interest the prospective tenant, because of the almost prohibitive cost of installing his own necessary alternating current wiring installation.

The Electrical Division of the Department of Building and Safety, City of Los Angeles, requires that all service wiring be installed by the consumer to either the basement or to the roof line. (State Safety Orders.) In many of these older buildings the construction of the building is such as to prohibit entirely installing the wiring from a tenant's premises to the basement. Therefore, any necessary service wiring **must** be carried to the roof. It will be seen readily that the thought of paying for possibly two to six stories of conduit run to serve his power installation is not relished by the tenant.

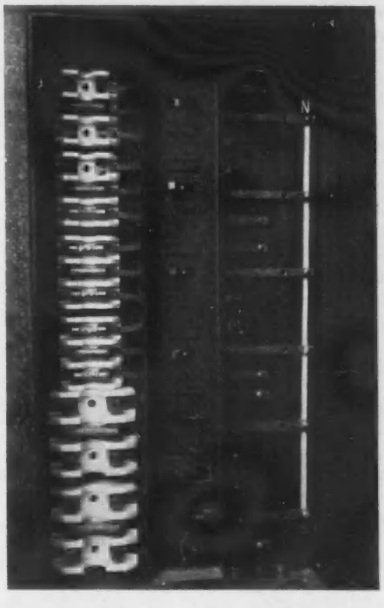
Re-inspection Demands Rewiring

Coupled with the above conditions is the present system of re-inspection now in operation in Los Angeles. Under this system the Electrical Inspection Department of Los Angeles is making a thorough canvass of the condition of existing wiring installations on all buildings in the business area. Naturally buildings of the older type are being pretty hard hit, as many of these installations are in a condition extremely hazardous to both life and property. In the majority of these cases it means a material re-wiring to bring the wiring installations up to the present code standards.

In such buildings the new system of four-wire servicing has proved a boon to the building owner. If there are installed one or more risers throughout the building the prospective tenant will be required to make only a comparatively small investment in order to receive the power service he desires from such a riser location.



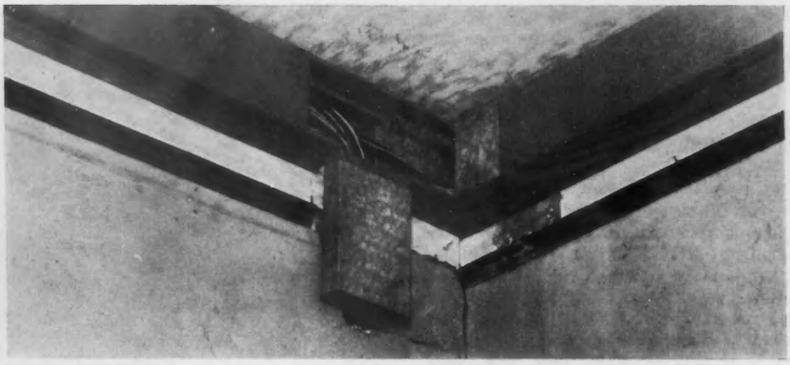
Metering closet in old building, containing at left the new d.c. panel and four-wire panel at lower right, a close-up of which is seen below. The telephone panel at extreme left had not yet been placed in position. These panels are located in janitor's closet on each floor.



Another very desirable feature is the elimination of the former unsightly systems of roof wiring. The majority of these old buildings are provided with one or more janitors' closets on each floor for the storage of brooms, mops, waste paper, etc. With a very small expenditure of money these closets usually can be arranged to accommodate the necessary distribution panels, meter space, etc.

To encourage this type of installation the city inspection department points out the advantage of a better connected load balance of all 220-volt, single-phase power. This in reality is a liberal demand factor, which will increase connected load capacity between different phases of the risers, with a consequent saving to the building owner on equipment. With the old system employing single-phase risers, 220-volt loads would have to be connected to the same phase. The new system also offers an economical means of providing for future three-phase load, where present demand requires only the single-phase service.

A typical power panel designed for use on the new four-wire servicing system is shown in Fig. 1. This drawing shows eight sections, each intended to serve one tenant. It will be noted that there are three fuses and a three-pole switch provided for each section. As the system of grounded non-fused neutral is now in effect in Los Angeles it will be seen that this panel is adapt-



At left a partial view of the rear of the new switchboard showing the neutral terminal strip. Above is shown the method of rewiring by means of metal double-channel gutters installed at the ceiling line of the room.

able (up to the switch capacity) to any type of load the tenant may have.

How It Works Out

Let us see how this works out. A tenant rents space in the building and uses only lights and electric irons. In that case the wireman places a bus fuse in the neutral, and fuses of proper capacity in the two outside legs. The utility serving the building sets the regular type of single-phase meter.

Now, suppose the tenant desires to install a small three-phase motor to drive sewing machines. The wireman pulls in the necessary fourth wire from the tenant's premises to the distribution metering panel. He then removes the neutral wire from its former middle position and connects it to a terminal screw (not shown on drawing) located on the neutral cross bar at the bottom of the panel. He next moves the adjustable stud (shown as small circles on upper cross bars) from Neutral (N) to Teaser (T) and removes the bus fuse.

The last operation is to connect the new fourth wire to the middle fuse. The tenant now has a combination feeder supplying both single and three phase to his premises. The utility provides one of the new four-wire meters and the combination load is billed off the one meter. Fig. 2 shows schematic wiring and internal connections of a self-contained meter designed for small loads. In Fig. 3 is shown the set-up for a load large enough to require current transformers.

Many of the old type of large buildings in Los Angeles, now being wired to meet present requirements, are installing this new system.

One of the best examples typical of many of these installations is presented in the installation recently completed in the Bradbury Building. This is one of the picturesque pioneer office buildings of Los Angeles with its open center court and open shaft hydraulic elevators. It is equipped with its own power plant for supplying d.c. to the building lights as well as some d.c. power. The d.c. load capacity is 1,200 kw., 119-220 volts. A 100 per cent throw-over service connection on the d.c. load is maintained by the utility serving this building.

In the Bradbury Building

Until this building was re-wired to accommodate the new four-wire system, no alternating current was available in the building except by the usual roof services. Under the new arrangement 600 amp., four-wire combination single phrase and three-phase feeders were provided throughout the building. All roof services (and consequent fire hazards) were removed and replaced by permanent conduit and gutter wiring between the rental spaces and the metering panels.

An accompanying picture shows a typical four-wire power panel as used in this building. It will be noted that this panel is constructed single width only. This was made necessary by the limited space allowable for installation. On the left can be seen the fuse blocks with the removable neutral bus fuses in position. Four 30-amp. and two 60-amp. tumbler switches are shown in the center, under the covering plate.

On the right are shown the cross connecting buses with the interchangeable studs. It will be noted that the neutral is marked "N" and is painted white further to distinguish it. Later practice has shown that where the load requirements of future tenants cannot be determined accurately it is much better practice to provide all switches and fuses of at least 60 amp. capacity. Fuse reducers may then be used where the load falls below the size of switch and fuse.

A typical installation at one of the metering closets is shown in another photograph. This shows very clearly the possibilities of making a sightly and compact installation. The new d.c. lighting panel and floor meter can be seen on the left. This new panel replaces one of the old link-fuse kind typical of all those originally installed in the building. One of the new four-wire power panels, with four of the tenants' meters in place, is seen on the right. On the extreme left of the picture can be seen the telephone "strip" box for that floor before re-wiring. It too is housed in a modern panel. All incoming a.c. current passes through a master meter on the main switchboard in the basement and is billed to the building owner.

Another picture shows one of the most interesting features of this job, a typical view of the new steel gutters used to carry the wiring between meter closets and tenants' premises. This gutter is rectangular in cross-section, of 2½ x 8½-in. dimensions, and made up in 8-ft. lengths. A total of 3,000 ft. was used in this installation. In the picture can be seen the two d.c. power wires on top, while the a.c. power wires are carried in the lower compartment.

This type of construction meets the code rule which requires wires of different systems to be carried in different compartments. This picture shows the construction used in dropping to a lower level to pass under a floor supporting beam imbedded in a partition.

In the basement an ample new dead-front, live rear switchboard was installed to complete this job. All meters for the first floor store rooms are installed on this switchboard, thereby eliminating the former system of placing them under stairways, over show windows, in cubby holes, etc. One end of the board is used for the d.c. system generators supplied by the building lighting plant.

The picture of the switchboard reproduced here is one giving a partial rear view showing the d.c. end. This picture shows the generous size of the "pick up" box at the top of the board. The neutral terminal strip of the d.c. lighting feeder system will be noted inside the lower edge of this box. An interesting feature of this installation is the fact that all of the feeder conduits are run overhead and terminate in this box. The main switchboard and all panel boards for this installation were designed and manufactured by the Diamond Electric Company of Los Angeles and San Francisco. The installation was made by the Electric Appliance Shop of Los Angeles.

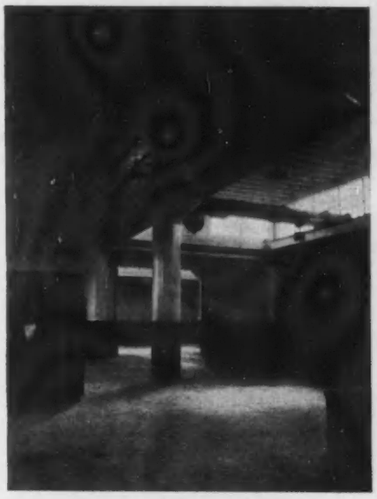
Due credit for working out the necessary details of this new type of servicing and metering system must be paid to the men who have given freely of their time and knowledge to its perfection. Among these are: H. W. Bruce, manager meter laboratories; and E. J. Swanson, underground service engineer, Bureau of Power and Light, Los Angeles; C. F. Ginther, underground service engineer, Los Angeles Gas and Electric Corporation; H. La Prade, commercial engineer, Bureau of Power and Light; Cecil Davey, electrical inspector, and G. G. Bakewell, designing engineer, Diamond Electric Company.

Neat Open Conduit Wiring for Industrial Plant

White Motor Company Los Angeles Plant Typical of Well Installed Jobs for Lighting and Ventilation in Southwest

ALTHOUGH open-type conduit construction was required by the White Motor Company in its new branch plant at Los Angeles, built there recently by the Stone & Webster Company, every detail of that wiring was made to carry out the best ideals of neatness and efficiency by the Newbery Electric Corporation, Los Angeles. The major electric load is in lighting. Aside from motor uses for machine shop purposes, the other load consists chiefly of ventilating and heating motor fans and automatic door control.

Basement lighting in open conduit had to dodge sprinkler system.



Above, fan and heater installation. Below, typical main floor lighting.

The door openers used are on four-way switches, controlled from three different locations. Any set of doors may be opened individually or all may be opened collectively.

The fan system is extensive both for exhausting automobile fumes and for circulating heated air. Steam heaters were used in this connection.

A feature of the main switchboard is that it is dead front and dead back. Services are brought in through two 4-in. conduit loops to the top of the board from the transformer vault adjacent to it, as shown in the photograph. All feeders to the building are then fed from the switchboard by means of the large gutter shown emerging from the top and center of the board. Conduit runs terminate in a pull-box outside the switchboard room.

The installation was supervised by Irvin C. Bruss, engineer for the electrical contractors.

Main switchboard.

Less Light in the Rafters But More in the Cooking Pans

AN unusually fine opportunity for demonstrating the benefits of correct industrial lighting exists in the Schukl & Company cannery at Sunnyvale, Calif.

The expanded plant, as it now stands, houses the equipment and process lines. One picture represents the old part of the cannery and the other the new. The two photographs show the difference in the old lighting and the new. There is a cheerful brightness to the illumination in the new section where the far end of the building can be seen easily. There is a noticeable lack of light-wastage in the space around the trusses.

In the old section 100-watt and 150-watt clear lamps are hung on drop cords on approximately 10 x 10-ft. centers and 9 ft. from the floor. Most of the lamps are bare, several have tin shades, and the light intensity is only 1½ to 4 foot-candles.

Within the new area all the lamps are properly shaded with porcelain enamel standard RLM dome reflectors suspended on conduit from 4-in. outlet boxes containing Benjamin shock-absorbing fixture aligners. In the receiving department the 200-watt bowl-enamel lamps, on approximately 16 x 20-ft. centers, give a light intensity of 3½ to 6 foot-candles. The 150-watt bowl-enamel lamps, on 10 x 10-ft. centers over the cutting tables, are approximately 9 ft. above the floor and give 10 to 12 foot-candles of light. At the canning tables, the localized general lighting of 200-watt lamps on 8-ft. centers give 20 to 28 foot-candles of light. It will be noted that the interiors of the pans are clearly visible without shadow.

The cannery management is so pleased with the results from the new lighting that it likes to tell the following story on itself:

It happens that the women piece-rate workers are shifted from one side to the other. In a surprisingly short time they discovered the side on which they could work best and earn most. As a result, they jokingly voiced their objections to the foreman when changing from the new light to the old, by saying: "Give us lanterns so that we can see to work faster." They had found that they earned more money working on the new side.

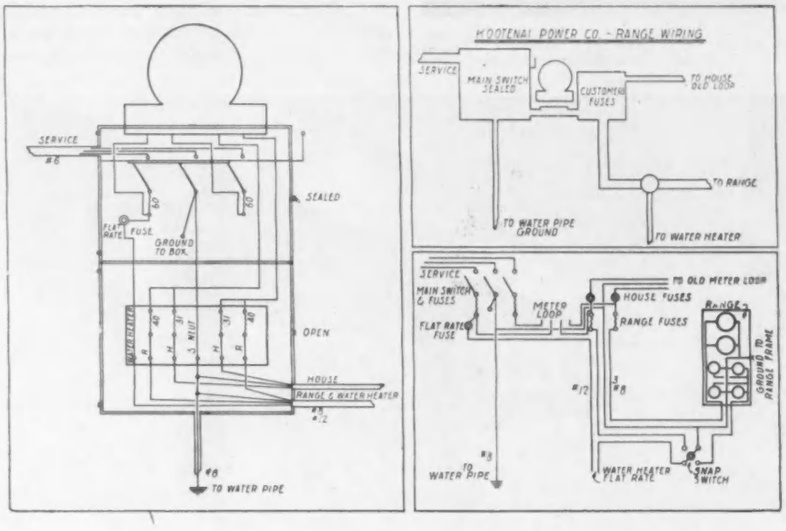
Coast Electric Service of San Jose, Calif., put in the installation in record time while the cannery was in operation.

Another Range Wiring Standard From the Northwest

NOTHING has stirred so much comment in recent months as the subject of range wiring specifications in various parts of the West. Following the publication of the standards adopted tentatively by the California Association of Electrical Inspectors for one year's test (see Electrical West, May 1, 1928, p. 258) and the subsequent story on the installation used in Spokane on the lines of The Washington Water Power Company (see Electrical West, June 1, 1928, p. 620), a letter has been received from H. A. Mathews of the Kootenai Power Company, Ltd., of Coeur d'Alene, Idaho.

Mr. Mathews sent two drawings reproduced above. The first drawing is that of the range wiring hook-up employed on the system of his company. Of it Mr. Mathews says, "This installation has proved very satisfactory and the cost is not exhorbitant. The installation is conduit complete from service entrance to range receptacle and to water heater wherever the tank is located. The range is connected by flexible cord to a three-pole separable plug made by the General Electric Company. A charge of $40 is made for this installation by one of our local contractors."

Mr. Mathews also makes a recommendation to manufacturers in the latter part of his letter dealing with the accompanying sketch suggestion. He



says of it, "If some manufacturer would make a box like this one (the drawing at the right), the installation could be made much more neatly, the cost not increased and time would be saved in making the installation. This would call for a new type of main switch box, combining with it the customer's fuses. The box would have two doors, the top half sealed shut as in present installations. I would appreciate any suggestions on this type of installation."

Range wiring standards from other parts of the West will be welcomed by Electrical West in order that a better comparison of standards may be made for all concerned.

Figures on First Minimum Installation

In this connection the figures submitted by C. A. Rowley, Electragist of Pasadena, on the first installation made under the new minimum range specifications, will be of particular interest. The following figures represent actual cost of installation, without adding overhead or profit:

STANDARD RANGE INSTALLATION.
ALTADENA, CALIF.
JOB NO. 1.

Service run	4 ft.	
Service wires	3 No. 4's	
Service switch	60 amp.	
Range run	30 ft.	
Ground run	10 ft.	
Run to old service	3 ft. (conduit)	
Cost: Materials	$20.04	
Labor	11.26	$31.30

Note 1: Labor rate $9 per day.

Note 2: Range connected by Edison company when delivered.

Note 3: Working conditions unusually favorable.

Further data on costs of such installations will be welcomed by Electrical West for comparison. In the interest of making available some authentic data on the cost of wiring for ranges other contractors making installations are urged to send similar brief statements to this magazine for early publication. By such data a more complete understanding of the contractor's side of the problem may be presented to other branches of the industry. Address such reports to the Contractor Editor, Electrical West, 883 Mission St., San Francisco.

"Iron Clad" Apartment Switchboard

An interesting installation of switches to take care of all-electric apartments in Marysville was worked out at Dunning's Apartments by G. J. Elbert, Electragist of that city. The switchboard was mounted on sheet metal and placed at the head of the stairs near the entrance to the apartments. It was made up of standard type externally operated switches, the tops of which were knocked out to allow fitting the base of the meters into the top of the switch can. A metal gutter connected each of the switches laterally with each other and the main service switch at the left-hand side of the board. Short buses were made up to connect between switches.

A trough running along the back of the board is used as a pull box into which to pull in the service feeder from each apartment. One-and-a-half-inch conduit is used for each run. Each

apartment is equipped with electric heaters, electric range and water heater.

In order to concentrate the main service switch and current coils a can was built to cover up the current coils and placed directly below the service switch, the bottom of which was cut out to accommodate this arrangement. A time clock for hall lighting is also incorporated on the board.

The installation makes a neat job, no wires or conduit being visible.

Red Seal Apartments Eliminate Janitor by Ingenious Hookup

A PARTICULAR feature of the Musgrove Red Seal Apartments at Jones and Chestnut Sts., San Francisco, is found in the control of the heating by the owner. There are five three-room apartments each containing an electric range and air heater in each room. Hot water is supplied from a master 100-gal. electrically heated tank. The room heat is supplied by the owner who controls it as a janitor might the steam heating of an apartment house by means of a double-throw switch located in a clothes closet in her apartment. Since all electricity for lighting, heating and cooking is furnished with the rent, being billed to her through a master meter, the double-throw master switch on the heating gives her central control. Individual switches at the heaters may also be employed by the tenant in case the heat is not desired on. Another feature is that each heater is connected to a panel in the owner's apartment and can be switched on or off in case an apartment is vacated. This system was sold on the basis of the saving in operating costs, in janitor hire and in cleanliness by Lloyd Kinkaid, Electragist.

Twelve Progressive Steps in Making an Estimate

An X-Ray of the Routine Followed in Taking off From Plans and Specifications by Which Any Other System May Be Compared

By H. K. BURDICK, estimator, Newbery Electric Corporation, Los Angeles.

IT IS the purpose here to inform the reader of the consecutive steps advised for the complete routine of a set of plans and specifications from the time they enter the office until the bid is submitted.

1 Upon receiving plans and specifications, immediately count outlets and segregate as follows: Number of ceiling, switches, brackets, base plugs, 3-way, 4-way, special, etc., per room or per floor as desired.

(a) This takes advantage of two things.
1. After you have checked over these plans eight or ten times for outlets, you have made yourself familiar with the layout.
2. Should plans be called for unexpectedly, you have somewhat of a record of them, and also you are able to check your total in item No. 7.

2 Read specifications thoroughly, and as you do make notes and list any special items, etc.

3 If job is laid out, electrically, that is engineered, and specifications are in full detail regarding switchboards, panel boards, etc. —immediately call for sub-figures in order to give sub-contractors ample time.

4 If job is not laid out—

(a) Consider job, whether store, office, apartment, factory, etc., and fix rating of each outlet.

(b) Make layout—(Note: I use Rollin Smith's Handbook for short cuts.)
1. Use red crayon for ½ in., yellow for ¾ in., and white for 1 in. or over.
2. Place circuit number, wire size and wattage on runs.
3. Call light, power and telephone utilities and inspection department regarding special work.
4. Total all wattage, number of circuits, switchboard, etc., and make notes.

5 (a) Make take-off of all circuits in **inches.** (I use a 6-ft. steel tape and yellow pencil and mark each run taken off, so if interrupted, can find where I left off and list as shown in the table below.)

(b) Make one line elevation (see Fig. 1), showing height of base plugs, 10 in.; switches, 4 ft.; brackets, 6 ft., 6 in., etc. Check this and multiply each respective distance of conduit up or down by total number of outlets.

Every estimator or contractor doing his own estimating has a system of his own. The system outlined here is not intended to be held up as the ideal or perfect system, for which all others should be scrapped. It is, however, a complete and a practical system and may contain suggestions which will help others. It has been said of estimating routine that any complete system is good, as long as it is followed rigidly and thoroughly. The sequence of some of the steps may vary, but in this system a logical order is preserved.

6 Take off feeders, sub-feeds and other special heavy conduit runs over 1 in.—in **feet**—more accurate.

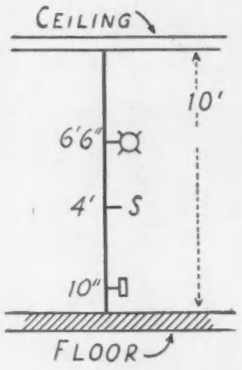


Fig. 1. One line elevation.

7 Total all items taken off—check outlets with first count. Total all conduit and wire taken off in **inches** and multiply by constant of scale, as ¼ in. by 4; ⅛ in. by 8, etc., which will then total in feet. Add a percentage for loss in wire and conduit and then make grand total of all conduit and wire including feeders, sub-feeds, etc.

8 Transfer from this sheet to price sheet, segregating all items as, conduit, wire, boxes, etc. (a) Use red check mark when transferring.

9 Price materials.
(a) Place cost of material to each item before making any extensions.

(b) Should have received all sub-bids and special prices by now. If not call and list.

(c) Extend all prices; one operation.

10 Place labor units to each item before extending, then make extensions; one operation.

11 Total wire, conduit and material separately. Total labor separately.

12 Add inspection, carfare, job expense, insurance, etc., and job factor and total all items. We now have a complete estimated total cost of job ready for final **mark up**—either by the **boss** or yourself.

A record should be kept of each job, it should be classified and filed with a list of bids and any other information which might assist in a future estimate.

Editor's Note—In the interest of better estimating methods Electrical West will be glad to print comments on this method or suggested improvements to it or to any of its twelve steps of procedure. Item 7 for instance is one on which few estimators agree. The merits of each system will be of interest to estimators everywhere.

CIRCUIT NO.	CONDUIT			WIRE		OUTLETS			
	½	¾	ETC.	#14	#12	CEIL.	BKTS.	SWS.	B. P. ETC
#1	10			20		8	1	1	
#2 - #3		6			24				
	4				8				12

Typical take-off sheet method of listing materials, etc.

Without kitchen ventilation guests are often made aware of the contents of a meal, to the embarrassment of the hostess, long before it is served.

Ventilation for the Home

By
J. R. WILSON*
Quality Electric Works
Los Angeles

Electrical Estimating Series—xxxix

APPLICATION of electric ventilation to residences, apartment houses and other places of abode should prove of interest to every electrical contractor. It is safe to say that kitchen ventilation at least is considered as standard equipment in the majority of homes now being built. In the higher priced class of residences and apartment houses complete systems of electrically operated and controlled ventilating equipment are not uncommon.

Architects and builders alike rapidly are giving recognition to the value of clean, healthful atmospheric conditions in the promotion of health in the home. It therefore behooves the progressive electrical contractor to become conversant with this newest trend in modern home equipment, to the end that his yearly revenue may show a substantial increase.

Kitchen Ventilation

Residence kitchens may be effectively and economically ventilated by the installation of ventilators placed in the outside wall adjacent to the range. This method is clearly shown in Fig. 55. To be most effective the fan should be placed near to or directly over the range with an unobstructed passage to the

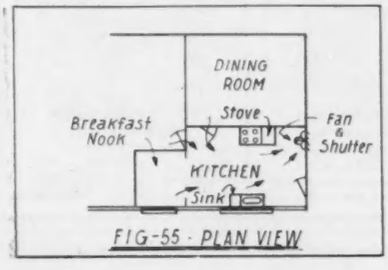


FIG-55 - PLAN VIEW

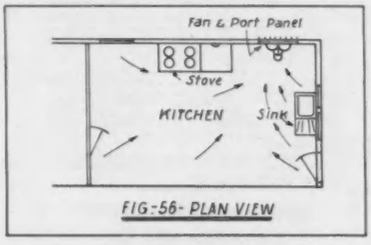


FIG-56- PLAN VIEW

outside air. Thus the air from the dining room and other parts will be drawn toward the kitchen, thereby preventing kitchen odors circulating throughout the house.

It is important to place register openings in the door between the dining room and kitchen at both top and bottom so as to enable the fan to create a circulation. For installations in new residences many manufacturers now supply a built-in unit, consisting of a wooden or metal frame, automatic shutter and fan. During the course of construction an opening of suitable dimensions is roughed in in the outside wall. After the walls have been plastered and finished it is a simple matter to set the unit in place and fasten it with wood screws.

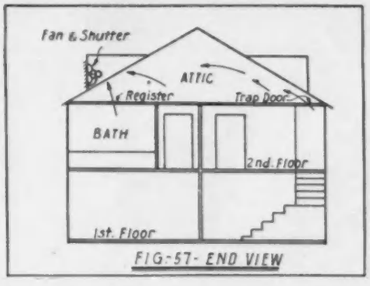


FIG-57- END VIEW

Where the house is already built or for other reasons it is not desirable to place the ventilator in the outside wall recourse can be had to the window unit. This consists of an adjustable metal frame and fan, with or without the automatic shutter. These adjustable frames are so constructed as to permit installation in a wide range of window sizes. This type of unit should be so placed as to exhaust the heat and fumes directly to the outside air. A typical application is shown in Fig. 56.

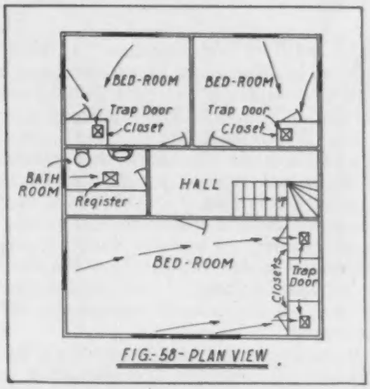


FIG-58- PLAN VIEW

Residence Ventilation

The cooling of residences in summer can readily be accomplished by the installation of ventilating fans. Where the construction of the house will permit this, is easily and economically effected by placing the fan in a dormer window in the attic, as shown in Fig. 57. By placing openings in the clothes closets as shown in the plan view (Fig. 58), the air from the various rooms is drawn into the closets by leaving the doors of the latter open, and hence into the attic as shown in Fig. 57.

This system will cool the attic space in the day time as well as at night and causes a very comfortable circulation of air throughout the house. The bathroom also can be ventilated by placing a register in the ceiling. To be completely effective, all other windows or openings in the attic should be kept closed when the fan is in operation so that all air is drawn through the closet and bathroom registers. This system will also affect the lower floor because the air is drawn upward through the stairway. Where heat conditions tend to make sleeping at night uncomfortable the system offers an effective and economical solution.

In deciding on the sizes of fans to use, a simple method is to figure a two to three-minute air change in the attic space. This will usually give an appreciable flow of air in the rooms below. This is emphasized on a warm sultry night when sleep would otherwise seem impossible.

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Better Merchandising

Advertising Barrage Prepares for Store Opening

Public Told Reasons for Starting of New Merchandising Department Service by San Diego Central Station in Series of Messages

AS A CENTRAL dispensary of "Electrical Happiness," whose branch dispensaries for some months had been in service before it, the new appliance store of the San Diego Consolidated Gas & Electric Company was opened with formal ceremony and the usual type of festivities, June 16. In a day when new central station merchandising store openings, however, have become the usual order of business the San Diego opening bears particular interest because of the manner chosen for its launching.

It was two years ago that the Byllesby Engineering and Management Corporation announced a merchandising policy for its Western companies. Since that time by gradual steps each of the companies operated by that corporation has inaugurated merchandising stores as fast as circumstances would permit.

The San Diego company, however, was detained by a peculiar set of circumstances which made its method of procedure differ from that of other properties. Instead of the central store opening first, to be followed up later by branch office stores, the procedure here was reversed.

The branch stores, opened at the company's district offices, were the first to be opened. In this case the procedure

The STORY OF ELECTRICAL HAPPINESS
A Story of Electrical Happiness
With many beginnings but no endings
How many times have you selected an interesting story from some popular magazine, read with intense interest through many continued pages, and then just as the climax seems within reach—you run on to that line "To Be Continued"?
The Story of Electrical Happiness, we will tell in 12 complete chapters; each will have a definite beginning, but there can be no ending to such a story which would necessarily tell of the pleasurable uses of electrical appliances. This story will appear day by day, occupying this same space. We hope that it will prove interesting, as well as profitable reading for it announces a new kind of Public Utility service.
Electrical appliances are economical to operate. New electric rates effective since April 20, 1925, still further reduce the cost of operation.
SAN DIEGO CONSOLIDATED GAS & ELECTRIC CO.

was a natural enlargement of the more limited merchandising activities of the company conducted from these district offices for many years. In fact electric ranges and water heaters and, to a limited extent, smaller appliances have been sold from these district offices since their inception.

The branch stores, therefore, were but the enlargement of store facilities, the addition of stock and the establishment of a more intensive merchandising campaign, directed by A. E. Holloway, superintendent of the commercial department and under the direct charge of Edwin Meise, now superintendent of merchandising.

A New Commercial Policy

It has been the policy of the company in San Diego, however, until the store opening, to rely wholly upon outside electrical and merchandising outlets for the sale of current consuming devices. The company, however, always entered into every form of promotional and load building activity which the electrical industry in San Diego undertook and initiated many movements to stimulate electrical sales in that territory.

With the exception of early-day campaigns with electric irons, and more recently its succeesful campaign with

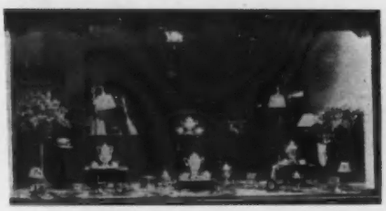
The STORY OF ELECTRICAL HAPPINESS
Something New in Public Utility Service
SAN DIEGO CONSOLIDATED GAS & ELECTRIC CO.
The STORY OF ELECTRICAL HAPPINESS
Six Electrical Stores and the Seventh!
SAN DIEGO CONSOLIDATED GAS & ELECTRIC CO.
The STORY OF ELECTRICAL HAPPINESS
ARE NOW at WORK
SAN DIEGO CONSOLIDATED GAS & ELECTRIC CO.
The STORY OF ELECTRICAL HAPPINESS
Use the Proper Tools
SAN DIEGO CONSOLIDATED GAS & ELECTRIC CO.
The STORY OF ELECTRICAL HAPPINESS
Not a Monopoly
SAN DIEGO CONSOLIDATED GAS & ELECTRIC CO.

Above, the first, and below it, succeeding advertisements of the series which announced the opening of the new merchandising department at the San Diego main office.

Windows on E Street side make the entire store interior a window display.

kitchen lighting units and lately electric ranges and heavy duty appliances, the company in San Diego has not actually merchandised.

Under the new merchandising policy of the Byllesby organization interest has centered upon the ultimate opening



One of the front windows with small appliance displays.

in San Diego of a large appliance store, to act as a model electrical department store, stimulate electrical appliance business generally and add load to the company's lines. But space for such a store was not available immediately.

After taking over the former Timken Building, revamping it completely and changing it to the Electric Building, the company was in possession of ample space for its activities. However, a lease, held by a bank, on the most desirable main floor location for such a store, made it inadvisable to put up temporary quarters. The lease expired recently and the large space occupied by the bank at the corner of the Electric Building, Sixth and E Sts., was taken over for the store.

Meanwhile all details of the merchandising procedure, all plans for the store, were being given painstaking thought and revision. While the remodeling of the space for the store was going on from previously arranged details, the plan for the launching of the store for its San Diego public was prepared.

F. M. Raymond, formerly editor of the News-Meter, company house organ, was promoted to advertising superintendent. The merchandising activities long under the guidance of Edwin Meise were consolidated by him under his new position as superintendent of merchandising.

The Advertising Barrage

To prepare the public of San Diego for this new service feature, as well as to launch the merchandising activity under the most favorable auspices with public acceptance, understanding and good favor, a series of twelve advertisements was laid out. These were to run in all daily papers for twelve days previous to the opening.

The central idea, to tie all of the series together into one continued and logical explanation, was centered about the slogan, "The Story of Electrical Happiness." As may be seen by a glance at the accompanying illustrations, the series left no point uncovered as to why and how the new merchandising policy was to be carried out.

The first advertisement carried the announcement of the series and set forth first the statement which was to clinch the sales argument in each succeeding installment. The statement was: "Electrical appliances are economical to operate. New electric rates effective since April 20, 1928, still further reduce the cost of operation."

An interior view showing appliance counters.

The second advertisement told of the opening of the company's stores in order to be able to recommend to its customers various types of appliances. The third told of the six other stores opened at its district offices. The fourth advertisement told of the re-

The STORY OF ELECTRICAL HAPPINESS
WE BELIEVE IN TELLING THE WORLD
SAN DIEGO CONSOLIDATED GAS & ELECTRIC CO.
The STORY OF ELECTRICAL HAPPINESS
MEET OUR FIELD REPRESENTATIVES
SAN DIEGO CONSOLIDATED GAS & ELECTRIC CO.
The STORY OF ELECTRICAL HAPPINESS
Do You Employ Servants?
SAN DIEGO CONSOLIDATED GAS & ELECTRIC CO.
The STORY OF ELECTRICAL HAPPINESS
Our Little by Little Plan
SAN DIEGO CONSOLIDATED GAS & ELECTRIC CO.
The STORY OF ELECTRICAL HAPPINESS
ASK HOW IT WORKS
SAN DIEGO CONSOLIDATED GAS & ELECTRIC CO.

modeling being done to prepare the new store for the opening.

The fifth advertisement broke into the merchandising message, basing its appeal on the use of proper housekeeping tools in the home. The sixth advertisement faced squarely the question of monopoly in appliance selling by stating the company's policy of stimulating electrical sales for all dealers of electrical appliances and by its efforts better to acquaint the public with the value of electrical appliances.

The seventh of the series announced the advertising policy, that of "telling the world" through extensive newspaper and direct-mail advertising, cooking schools and appliance demonstrations, of the convenience and economy of electrical appliances. The eighth introduced the field sales force and gave them the dignity of fully accredited representatives of the central station which has always earned public approval.

The ninth advertisement told of electrical servants which would be made available to everyone through the new store. The tenth offered a "little by little" plan of payments, thus introducing a new and more attractive terminology for the old installment or easy payment plan. The eleventh advertisement offered the advice and counsel of the company on appliance selection and full and cheerful explanation of the operation, care and cost of any appliance.

The twelfth advertisement appeared the day before the opening and was centered in a full page layout. It took the form of a personal invitation to the reader to attend the opening. Around the characteristic copy was run the advertising of the particular merchandise bargains offered opening day.

Concluding advertisement of the series run on the day preceding the store opening, announcing opening day merchandise specials. The typical advertisement of the preceding days was used as the central portion of the full page spread.

Other Advertising

In addition to the newspaper advertising 37,500 letters with postal enclosures were sent out to all customers of the company and 36,600 formal invitations were mailed to stockholders, appliances dealers and factory representatives. The newspaper space used totaled 776 column inches. Outdoor advertising consisted of four illuminated and unilluminated billboards. Newspapers gave wide publicity to the opening as a strictly news feature.

The opening took on all the air of a gala occasion in San Diego. Ten thousand people visited the store during the day and evening. Every woman visitor was given a corsage bouquet. Continuous demonstrations of electrical household equipment were held. Musical entertainment was provided throughout the day and attendance prizes, including a Telechron clock, bedroom lamp, and electric iron, were awarded.

With the opening of the store was launched, too, a system-wide campaign on cooker pots as the special for the month, and according to all reports this event has been particularly successful.

Dealer Attitude

An interesting reaction to the opening of the district office stores was experienced by the company, according to Mr. Meise. These stores were opened at the La Jolla, La Mesa, Coronado, Oceanside, Chula Vista and Escondido offices of the company. The local interest in them was found keen, but on returning from visits in San Diego many rural customers expressed themselves as disappointed at not finding in San Diego a much larger and more complete store than found at the district office. That was in the days before the new store in San Diego opened. Now that this central store is established it is felt that rural customers may have their wishes realized in a visit to the more complete establishment.

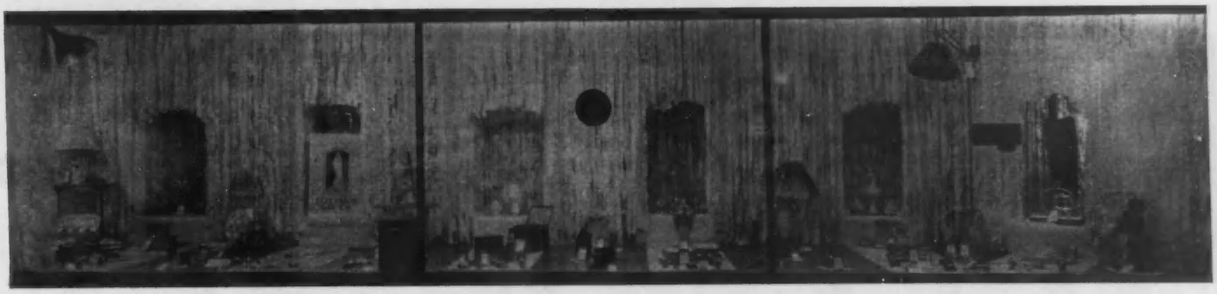
Dealers in the outside districts, where the stores have been established for some time, are said to be very favorable, even enthusiastic to the central station merchandising. The big advertising and publicity campaigns conducted on appliances, one dealer says, have stepped up his sales materially. The dealers in Oceanside are said to have sold three times as much of a featured appliance as the power company and one dealer expressed himself as "tickled to death."

The dealers are co-operated with in every way. In the sale of ranges each dealer who wishes it may have a range left on his floor for him to sell. If he sells he is given 15 per cent commission. If he gets a prospect which the power company salesman can close he gets a 10 per cent commission and the wiring. The ranges are not consigned, but are moved at the end of three months to prevent obsolescence.

One man in each district office is assigned to merchandise selling under the direction of the district agent. His efforts on the floor are supplemented by the sales force sent out from the main office. This sales force is a permanent one and is trained in company policy. Sales meetings are held every Monday morning.

The salesman carries with him in his car a vacuum cleaner, percolator, toaster and waffle iron, as well as a supply of lamps in cartons. These are carried in addition to the special advertised feature for the month, in order to make sales of these appliances where inquiry is made for them or a possibility of sale opens. Reports are made weekly to Mr. Meise, in time for review at the sales meetings.

Consistent and progressing normally at a steadily increasing rate in its rural territory the load-building activities of the San Diego Consolidated Gas & Electric Company along merchandising lines have not been spectacular and therefore have received little publicity. But the company in its new merchandising set-up will bear watching. If its merchandising activities parallel its street lighting work and not a few of its engineering achievements, it should contribute a great deal to the knowledge of the merchandising of electrical appliances.



The colorful display of the Turner Hardware and Implement Company at Modesto, Calif.

Sales Boosted by This Year's June Bride Windows

SET forth as a "two to one shot" by the California Electrical Bureau, the June Bride window display contest proved to be exactly what was promised for the six winners of the contest (listed in the last issue of Electrical West) and profitable to all others who participated.

The winners of the contest in the order of their award were: Scott Buttner Electric Company, of Oakland; Just-Rite Electric Company, Watsonville; Baker Avenue Electric Company, of Bell; Central Electric Company, Watsonville; Golden Gate Electric Company, San Francisco; and Mission Electric Company, of Santa Barbara. A full page of pictures reproduced the winning windows displayed in the Aug. 1 issue of Electrical West, p. 100.

In the opinion of the judges and of the California Electrical Bureau the contest this year was the best ever conducted from the standpoint of the number and quality of window displays submitted. The judges were A. G. Rohl, window display manager of O'Connor-Moffat & Company; H. F. Van Eckhardt, display manager, City of Paris; and A. A. Mannizzi, display manager of H. Liebes & Company, San Francisco. All entrants, including the winners, commented on the increased sales resulting from the window displays.

After describing the first-prize window in detail, E. L. Buttner added, "In submitting the photographs we wish to thank you for having interested us in putting in such a display as we feel well repaid by the advertising we have had out of it."

James W. Stratton, of the Baker Avenue Electric Company, Bell, winner of third prize, says of his display: "We have taken advantage of your 'two to one shot' in the June Bride window contest. We are satisfied that we have won the first half by increase of sales of appliances and many favorable comments."

Power companies, too, have displays. The Great Western Power Company circulated this display in all its district offices.

C. H. Johnson, who submitted the window display picture for the Missison Electric Company of Santa Barbara, said of his window:

We are very happy in having entered this competition because of the delightful increase that it made in our store sales. We found that the idea of the bride stepping into the new life of matrimony and master of her new assumed duties with the aid of modern electric appliances has resulted in bringing the electric appliances to the front as wedding or anniversary presents.

Winners of honorable mention in the contest also had much to say of the sales value of this display. J. A. Newton, Newton Electric Corporation of Glendale, winner in several previous contests, in describing the window display which is reproduced on this page, ended his letter with these remarks:

The point that seems more important to us in this window display than anything else is the fact that it has sold for us quite a number of the articles actually exhibited in the window and has caused many more people to stop and examine not only the special attention arresting feature (a model airplane), but the appliances themselves. We feel that this display is one of our most successful June Bride windows.

The Holland Electric Company, of Whittier, Calif., also won honorable mention and was very nearly chosen as a prize winner.

Another to win honorable mention was the Koch Hardware Company, San Francisco.

Other honorable mentions were given to the Hoyt Electric Company, Berkeley; Hill Electric, Holland Electric, Thayer Electric and Dresslar Hardware of Los Angeles; and Silverstone Electric and Collonan Electric of San Francisco.

A jobber's window in a manufacturer's establishment. The Pacific States Electric Company's display in the General Electric Company's lobby demonstration windows, Russ Building.

A wedding of electrical appliances as staged in the window of the Holland Electric Company at Whittier.

J. A. Newton, of Glendale, many times winner, successfully tied in the trans-pacific airplane hop with his display.

Nygaard Electric Company of Compton, winner of many contests, displayed the modern bride sitting on top of the world.

NEW RATES MAKE ELECTRIC COOKING VERY ECONOMICAL
And then
let the electric range do
all the cooking
Every woman loves to cook—when the monotony of cooking is gone.
That is what the electric range does. It eliminates cooking monotony. Its harmonious white porcelain enamel makes kitchens attractive. Its perfect baking wins appetites. And its automatic time and temperature controls do the cooking while you're shopping or at the movies.
The oven of the new electric range heats up to 400 degrees in 9 to 11 minutes—as fast as one can mix biscuits. The open coil cooking elements are now made smaller to fit your pans. Heat that was formerly wasted goes to work. The result is, food cooks faster—less electricity is used.
See the new electric ranges today. Ask about our special low terms.
PACIFIC GAS AND ELECTRIC COMPANY
P·G·and·E·
Owned·Operated·Managed by Californians

One of the advertisements used in the campaign.

"A Sign of Progress" in Electric Range

A year ago, during the same period and with the same organization the sales of electric ranges reached 391. *This year there were* 1,142 *ranges and* 386 *water heaters sold.*

AS A part of the Pacific Gas and Electric Company's creative electric sales program for 1927, there was included a special eight weeks drive on electric ranges during the months of June and July. A selling organization was perfected including man power, display, and direct-by-mail advertising; merchandise displays; window trims; and the use of all mediums of sales promotion regularly used by the company. The drive was conducted primarily in rural districts and the Hotpoint range was featured, although several lines were sold. Standard prices were maintained with a payment of $12.50 down and twenty months in which to pay the balance. Employee co-operation was solicited, with no special inducement offered except employee prizes.

At that time 391 ranges were sold, believed to be a splendid showing.

The success of the 1927 effort prompted the placing of a similar campaign for 1928 for practically the same territory. The drive opened April 30, after all employees in the affected areas had been advised through group meetings of the plans. The quota set was for 560 ranges and 280 water heaters, about twice the number sold during the previous years' campaign periods.

Each of the company divisions was placed on a competitive basis with a bogie set for local sales.

Electric
Range
$7.50
DOWN
Balance in
20
Monthly Payments
Until June 23 Only
New rates make electric cooking very economical
Have a modern, beautiful, clean kitchen. Banish drudgery and monotony. Delicious cooking is simple and easy, electrically.
June 23 is the last day for special low terms on an electric range. And, as you have only a few shopping days, our representative will help you in selecting a range suited to your needs. You have your choice of the many models of Hotpoint Electric Ranges. Write or phone us now.
PACIFIC GAS AND ELECTRIC COMPANY
P·G·and·E·
Owned·Operated·Managed by Californians

Small but striking advertisement.

Consumers were offered ranges for $7.50 down; balance in twenty equal monthly payments. A Hotpoint air heater was offered as a premium with each range sold. Employees were offered a bonus of $2.50 for each electric range prospect submitted and closed. Where a range purchase was made for their own use, employees received a 50 per cent discount.

Trophies were offered by Frank A. Leach, Jr., vice-president and general manager, for the divisions obtaining the highest percentage of quota during the campaign.

Salesmen's prizes on campaign percentage of quota included a G.E. refrigerator, set of silverware (valued at $150), set of silverware (valued at $75), Telechron mantel clock and Miller lamps. There were also eight weekly cash prizes and the salesmen's quota prizes.

Through the advertising department of the company, display advertising was made available, averaging 133 in. of display space in 60 selected weekly newspapers, this campaign being conducted exclusively in rural territory and there being no daily papers in the towns covered.

Two-color special campaign broadsides were produced, as were also mailing inserts and a standard 22 x 28 poster.

Each office maintained electric range window displays and company trucks carried banners of announcement.

During the 1928 campaign, which covered about the same period of the year as the 1927 campaign with approximately the same organization and reinforcements, the men sold 1,142 ranges and 386 water heaters. Hence the company's slogan, "A Sign of Progress," has been made to apply in electric range sales.

Employees turned in prospects, many of which are live for follow-up sales. The results of the contest indicate to the company that the day of the electric range is here—quality merchandise a fair price with easy payments and lower operation costs due to recent rate reductions.

In this eight weeks' campaign, 75,000 homes were called upon and sold the electric range idea—and as many more

Selling on P.G. and E. Company Lines

read the newspaper advertising and literature sent to them.

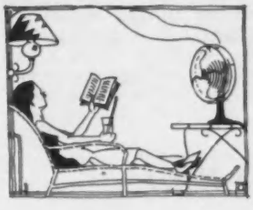
The execution of the campaign was directed by E. F. Perkins, electric sales engineer.

To H. B. (Jack) Heryford, goes the honor of twice being manager of the division to win the capital prize. Last year, while division manager of the West Side division, assisted by Harry A. Lee, division sales manager, he took first place. This year as division manager of the San Joaquin division, with Ward C. Schafer, sales manager, he again leads. H. A. Lee this year with Division Manager G. R. Milford, pulled the Shasta division through in second place.

The outstanding feature of the campaign was the high quality of ranges sold. Most of those sold were the larger and better types of ranges.

A beautiful, clean kitchen and perfect baking
for women who love modern methods
You'll always love the pleasing tones of a white porcelain enameled Hotpoint Electric Range. It harmonizes with any colorful decorative scheme.
And how this electric range improves cooking! Tender, juicy, browned roasts with all flavor sealed in. Valuable mineral salts retained in vegetables. Feathery light biscuits. Cakes fine in texture. Crisp, flaky under pie crusts.
And to think—no rushing home from parties when you cook with an electric range. Dinner placed in the cold oven at 1 o'clock will be ready to serve deliciously hot when you come in. An electric timer and temperature control do the cooking automatically.
Now electric cooking is more economical. For the P G and E recently reduced your electric rates, voluntary. That will save our customers $1,750,000 a year.
For a short time only, we'll install a Hotpoint Electric Range in your home for only $7.50 down. The balance extended over 20 monthly payments. Enjoy better cooking with less effort, electrically. Our representative will gladly show you beautiful pictures of the Hotpoint Electric Ranges.
Hotpoint Electric Heater worth $10 given FREE with the Hotpoint Range you select during this sale.
Hotpoint Electric Range installed in your home
$7.50 DOWN
Balance in 20 Monthly Payments
PACIFIC GAS AND ELECTRIC COMPANY
P·G·and·E
Beauty, cleanliness and perfect baking
for women who love modern methods
Now you can have a gleaming colorful kitchen.
For the Hotpoint Electric Range is designed to make kitchens beautiful. Its white porcelain enamel harmonizes with any decorative scheme.
And how it improves cooking! Tender, juicy, browned roasts with all flavor sealed in. Valuable mineral salts retained in vegetables. Feathery light biscuits. Cakes fine in texture. Crisp flaky under pie crusts.
You can stay away from the kitchen. Go shopping, to afternoon parties and not have to hurry home. An electric timer turns the oven current on and off automatically. Dinner is hot, ready to serve when you come in.
Now electric cooking is more economical. For the P G and E recently reduced your electric rates, voluntarily. That will save P G and E customers $1,750,000 a year.
For a short time only, we'll install a Hotpoint Electric Range in your home for only $7.50 down. The balance extended over 20 monthly payments. Enjoy better cooking with less effort, electrically. Our representative will gladly show you beautiful pictures of the Hotpoint Electric Ranges.
Hotpoint Portable Electric Heater worth $10 given FREE with the Hotpoint range you select during this sale. Write or phone today.
Hotpoint Electric Range installed in your home
$7.50 DOWN
Balance in 20 Monthly Payments
PACIFIC GAS AND ELECTRIC COMPANY
P·G·and·E

Two of the series used in all papers.



"Electricity is Cheap, Use More of It"

Winner of the second prize in the Three-Minute speaking contest at the recent P.C.E.A. convention was Ray A. Edwards of the San Diego Consolidated Gas & Electric Company, whose talk is published here. Each of the talks given will be published in turn in this series, which began in the August number. Excellent sales arguments are found in each talk.

Solid comfort—

—for the price of these

THE economy of electricity in industry and the homes of America is an established fact. During the past five years in this gigantic industry there has been an annual increase of $140,000,000 in revenue, and 650,000,000,000 kw.-hr. in electrical sendout. There was, during the year 1927, an increase of over 1,200,000 residential, and nearly 300,000 industrial and commercial customers added to our electric lines.

Millions of homemakers and housekeepers have learned that no other investment brings such a bountiful return in service, comfort and happiness. A few cents per day invested in electricity brings freedom from household slavery and changes drudgery into comfort and domestic peace.

The price of a 2-cent postage stamp provides the electricity to run a washing machine for a full hour. The power to run your ironing machine for an hour is furnished at one-half the cost of an evening paper. The old, dusty, "strong arm" method of sweeping has passed into disuse now that the electric sweeper can be run an hour for the price of a stick of spearmint gum. For the sick room, the electric pad is heated for an hour and a half for the price of a Camel cigarette, or an electric fan can be run for half a cent per hour. Electricity is **cheap**! Use more of it.

An electric room heater can be used one hour for the price of a Saturday Evening Post. Take a 1-cent stamp, tear it into five equal parts; each of these parts represents the cost of heating your curling iron or running your electric sewing machine for one full hour.

Four dollars, the price of a couple of theater tickets, will run an electric range for a month in the average family. One dollar and twenty cents will buy the power for your electric refrigerator for 30 days. Electricity is cheap! Use MORE of it!

For 8 cents, the price of a bar of soap and an evening paper, you can heat your breakfast room for an hour, percolate your coffee, heat the baby's milk, make toast for the invalid, make waffles for the entire family, and have more than enough electricity left to wash all of yesterday's dishes in an electric washer. Electricity is cheap! Use more of it!

These facts are illuminating, but over and above everything, we know "electricity is cheap" because it conserves the most precious thing in the world, human life. Where can greater comfort, happiness, or more leisure be obtained than by the use of electricity in the home?

Electricity is cheap! Use more of it!

Refrigerator Sales Outposts Set Up in Denver Drug Stores

Druggists used the machines for beverages and told advantages of electric refrigeration.

OUTPOSTS are familiar to the tactics of war. But outposts for the selling of electric refrigeration are new. Most dealers in electric refrigeration are content to maintain a central establishment. Sometimes branch stores are established, it is true.

It remained for W. R. Trippe, manager of the refrigeration department of B. K. Sweeney Electrical Company of Denver, to establish outposts for electrical refrigeration in neighborhood drug stores and meat markets in various parts of the city.

Late last January Mr. Trippe selected six first class drug stores in the residential section in Denver and one meat market downtown and arranged to put one of the General Electric refrigerators on display in each location without cost to the owner.

The druggists were urged to use the machines for fountain syrup, carbonated beverages, soda pop, etc. They were given elementary talking points on the advantages of electrical refrigeration. Special prospect cards were given to those druggists who received a commission of 2 per cent for all leads which resulted in sales.

Each machine was replaced with a new one every week or ten days. This was necessary in order that the refrigerators put out on demonstration would not be second-hand machines when they reached the ultimate consumer.

The refrigerator salesmen for the Sweeney company found that they could bring prospects to the different stores for demonstration in cases where the prospect would object to a longer trip to the downtown display room.

Many customers, according to Mr. Trippe, came to his display rooms saying that they had become interested in the machine on display in their neighborhood store.

Mr. Trippe attributes about 30 prospects to druggists. Of these five have been sold to date.

Attractive Refrigerator Display in Spokane

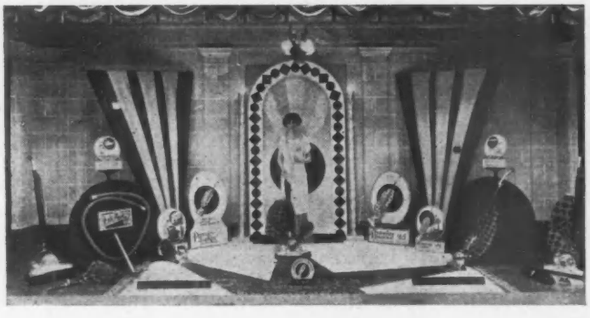
New showrooms have been opened at Spokane, Wash., by the Electric Refrigerator Company in the Moose Temple Building, where the General Electric line is displayed by this firm, distributors in the Spokane territory. Carl J. Searl is president and has adopted progressive and aggressive methods in merchandising refrigerators. A section of the main display room is shown.

Prize Winning Vacuum Cleaner Windows in the West

TWO winners of first prizes in national vacuum cleaner window display contests were in the West.

At the left is the prize-winning window decorated by J. U. Berry, display manager for the Valley Electrical Supply Company which won first prize in the Premier-Duplex electric cleaner contest held during national Premier week in April. This window won a prize of $100 for Mr. Berry from a field of more than 900 entries over the United States. This prize-winning photograph was given wide-spread publicity in merchandising papers and advertising throughout the country.

At the right is reproduced a picture of the prize-winning window of the Southern Colorado Power Company at Pueblo, Colo., decorated by Thomas A. Edmiston. The contest in this case was conducted by the Hoover company which wrote to Mr. Edmiston complimenting him on winning against a field of many hundred national entries. Mr. Edmiston has received attention for his skill in arranging floor and window displays at the merchandising store of the company in Pueblo. His Christmas windows won for the company a special article in the local newspapers last December.



Scouting for Sales Ideas

SCOUTING used to be an art limited to warfare and the hunt. Now it is an art applied to sport, society and business. The keenness of competition in all lines of business has made the scouting for new plans, new ideas, new products and lines, one of the most important functions of merchandising. While other lines of merchandise have long been aided by this function it is coming to be of more than passing importance to the merchant of electrical goods to utilize scouting technique where it will do the most good.

Again as in warfare, the classification of the information gained and the arraying of it in such shape as to be useful and available when and where needed, is as necessary as the scouting.

Where to do the Scouting

Nothing is so stimulating to the true merchandiser as a personal trip around, sampling the methods of other merchants, looking over their window displays, talking with their clerks, scanning their advertising, delving into their sales methods. But personal visits are not always possible or practicable.

The next best substitute is the trade magazine dealing with the selling methods of the particular industry, or any similar industry.

One of the most prominent merchandising men in the electrical industry in the West places great emphasis upon both his scouting tours and his magazines. He will spend entire days in big cities "window shopping," looking for ideas, visiting stores, sampling sales technique of various establishments. At home, he scouts just as religiously through the trade magazines for ideas.

He does not believe in subscribing to magazines, glancing over them hurriedly or skimming through what appears most interesting, and then tossing them on the shelf, possibly never to be looked at again. Nor when he recalls an idea he wants to use which he remembers seeing somewhere does he relish having to spend a lot of valuable time trying to find it. Therefore he has systematized his reading and the preservation of his ideas.

He believes in going through every issue with a fine tooth comb, advertisements and all, in search of sales-and-management first-aid ideas, workable plans which he can use on the every day firing line of business. As he goes along in his reading he marks everything which he deems important with a check mark in blue pencil. He then passes the magazine right on to the others in his organization to look over and mark their initials on the front covers, also to call attention to anything of importance which he may have overlooked, by checking with a red pencil.

"I always glance over every magazine from cover to cover," he says, "for I never know when even a sentence or a word may throw off the germ of an idea. I may stumble across a thousand dollar sales idea, or I may be able to develop a profitable advertising and selling campaign based on a single idea glimpsed from the pages of some magazine, or cut the costs of doing business, or what not. Sometimes a paragraph brings me just the very thought or information I have been trying to reach.

[and filing them so that they may be called to work when needed]

"As I go along in my reading I pick out all workable plans which I can apply to my own sales and management problems, or which will brush up my window displays, expedite my deliveries, turn the key-note of my advertising, put a sales kick into my salesmen, or give me a new angle on my service and management problems. In this way I gather a formidable array of ideas which I can put to work in my own business with profitable results.

"And I never put off my reading. I found out long ago that it was such an easy thing to do that I often neglected it, grew careless and indifferent about it, with the net result that magazines would accumulate on the shelves. So now I finish my task at a single sitting, if possible, and I never begin unless I am sure I can end it. It doesn't take more than an hour of my time at the most, and I find it pleasant and satisfying diversion. In fact, I get a lot of kick out of this eternal scouting for ideas. The big scheme is to catch these ideas on the wing and have them on file, properly indexed, so you can use them instantly when you want to put your fingers on them."

Incidentally he also tries to develop some ideas of his own, at least one new idea a week which he can use in his business to profitable advantage. He makes it a practice to note down each idea as it comes up and before it can get away, even if it is only in the rough. Some memo filed away containing that idea may prove priceless later.

After the magazine has been seen by everybody the binding clips are removed and all the marked sheets in the magazine taken out and filed away, according to subjects, running from "advertising" through "selling." They are put in filing folders in the lower right-hand desk drawer, within easy elbow reach. Some may prefer to file by other methods but this man says of his system:

"This file gives me an excellent array of all kinds of valuable business catching and management ideas, and I find

myself constantly drawing on this information for inspiration in the problems of buying and selling, office methods, credits and collections, advertising, sales ideas, service, in short, a most formidable array of ideas which I can put to work in my own business with profitable results.

"On the firing line of every day business ideas constantly come and go almost like a flash and like a flash they may vanish and so be gone forever, unless you corral them in time.

"Now I get the greatest pleasure and satisfaction out of working up schemes or developing ideas for application to my own problems. My idea-finder file is a distinctive first-aid in this respect. In fact I couldn't get along without it any more.

"Whenever I go over my file, which happens to be about once a month, I take out some of the most practical looking ideas which offer suggestions for immediate application or which may suggest other ideas for development. In this way I find new ideas constantly cropping up to which I had not attached any unusual significance before but had filed away thinking that possibly some day that same idea might come in handy in a pinch.

"I first started off my file with ordinary cardboard boxes, one for advertisements which appealed to me for use in framing or testing my own copy, or which might suggest the desirability of making purchases of advertised merchandise; one for office methods, including credits and collections; one for selling and one for delivery methods, one for service ideas, etc. I would clip my material and pitch it into those boxes any old way.

"Whenever I wanted an idea I would have to run through all the clippings in that box, and then as my collection grew I found this required considerable time, so I decided upon a more systematic organization of my ideas and adopted the filing folder method, which segregates each subdivision more minutely, yet brings all related material more closely together. But I still believe that is the best way to get started. Afterwards you can do as I did.

"I can now lay my hand on any needed information in my system in less than a minute. Everything is at my beck and call, right at my finger tips, whenever I want it."

News of the Industry

Boulder Dam Commission to Study Earthquake Hazard

(Washington Correspondence)

One of the most important duties of the commission is to form a conclusion as to the extent to which earthquakes constitute a practical hazard to dams in the lower Colorado River. This opinion of W. J. Mead, professor of geology at Wisconsin State University, and a member of the commission, was expressed after the initial meeting of the commission in Washington July 30.

Little was done at that meeting other than organization. Maj. Gen. William L. Sibert, retired, was chosen by his fellow members to be chairman. Charles P. Berkey, one of the geologists on the commission, was elected secretary. Offices for the use of the commissioners were made available in the Bureau of Reclamation.

Former Secretary Work, who appointed the commission on instructions from Congress, in remarks at the organization meeting indicated that he does not believe any further engineering study is necessary, but assured members of the commission that officials of the department will be ready and willing to weigh any new evidence that the commission may unearth. The big question for the commission to decide, in Dr. Work's opinion, is whether or not it is feasible to construct such a dam under physical conditions such as exist in Boulder Canyon.

Roy O. West, the new Secretary of the Interior, assured the Commission at its public session that every facility and resource of the Interior Department would be at its disposition. There is no agency in the Government more anxious to see the Boulder Dam question solved and solved properly, than the Interior Department.

Under the terms of the Senate resolution, no expressed authority is given the Boulder Dam Commission to do more than examine the proposed site of the dam and review the plans and estimates made for that particular development. The board is called upon for advice as to the "safety, economic and engineering feasibility and adequacy of the proposed structure and incidental works." It is doubted at the Department of the Interior if this includes the All-American Canal or other matters that are not directly a part of the project planned at the dam site. It is recognized, however, that reports made under Congressional resolutions frequently are much broader than are warranted by the specific language used.

On the other hand, the commission must submit its completed report by Dec. 1. Because of the short time for the study, it is expected that the board will be anxious to confine the report to the narrowest limits possible. It is not believed that any attempt will be made to deal with general problems pertaining to the Colorado River.

Tacoma Faces Increase in Street Lighting Cost

Final reports by Kenneth G. Harlan, city utilities engineer, upon the rates which the general fund of the City of Tacoma should pay to the City Light Department for lighting the city, indicate an increase of cost of lighting the city next year to about $106,108. But this bill for city lighting would then be only half what it would cost in the city of next lowest street lighting cost in America, New Bedford, Mass., the light department claims. The city taxpayers have been paying for several years only $71,000 for street lighting, and before that still less, so that for years the municipal power system has been paying a subsidy to the city in the form of unbilled current, according to the department. Commissioner Ira S. Davidson has been contending at budget-making time each year for more pay for street lighting, but always the exigencies of the budget have made the council refuse his request.

Now, however, the new charter requires that the city pay for its service the same rate that a private concern would for a comparable service, and it was to determine what this rate should be that the council last year requested Mr. Harlan to make a complete study of the matter. Under the charter the budget for 1929 will have to include the advanced rates reported to be legal.

The report gives the rate for bracket 100-cp. lights at $11 per year; and higher-powered lights of the same type up to $25.25 for 600 cp. Ornamental incandescent lights range from $6.70 for 100 cp. to $28.20 for 1,000 cp. This type is cheaper than bracket lights, due to the fact that the city installs the bracket lights and property owners pay for the ornamental type. The large luminous arc lights used on downtown streets are listed at $40.50 each per year. All charges include servicing the lights, replacing lamps and broken globes.

Washington Utility Buys LaCrosse Electric Company—Property of the LaCrosse Electric Company, LaCrosse, Wash., has been purchased by The Washington Water Power Company, Spokane, and merged into the general suburban system of the company.

Personnel Changes Made in Los Angeles Utility

Thomas P. McCrea, secretary and director of the Los Angeles Gas and Electric Corporation, has resigned, effective Aug. 1. He had completed more than thirty-five years in the service of the utility and decided the time had come to rest and enjoy life. Mr. McCrea entered the company's employ in 1893 in the auditing department and continued in that branch of work until 1916 when he became secretary of the company. He was elected director in 1920.

T. P. McCREA

F. E. SEAVER

F. E. Seaver, assistant secretary, succeeds to the secretaryship. He has been with the company since May, 1907, and is a director of the corporation. E. N. Simmons, auditor, has been given the additional duties and title of assistant secretary. His service with the company dates from 1909 when he began as a messenger.

Frank Weiss, manager of new business, has been elected by the board of directors to the directorship made vacant by Mr. McCrea's resignation.

Utility Enters Effective Float in Parade

In a recent industrial parade sponsored by the San Diego Chamber of Commerce this float represented the San Diego Consolidated Gas & Electric Company, San Diego, Calif. It caused much interested comment.

The tragi-comic contrast between the downtrodden toiler in the non-electric home and the contented and well groomed housewife in the Red Seal home made an effective appeal for the electrically equipped home.

Big Steam Plant Unit Adds to Engineer's Record

When the first of the eight 125,000-hp. units planned for installation in the Southern California Edison Company's Long Beach steam plant was turned on recently for the first time, S. L. Shuffleton was at the throttle. Mr. Shuffleton, as vice-president of Stone & Webster, Inc., has been in charge of the engineering of this unit and the six preceding units at this plant.

Mr. Shuffleton has had an interesting and useful career, which began in Eureka, Calif., with the Recks Water Company, where he obtained practical experience in various kinds of work and was called upon to solve many mechanical and hydraulic engineering problems.

Stimulated by a desire for further knowledge he devoted himself assiduously to the study of mathematics and civil and mechanical engineering subjects. He was made chief engineer of the Recks plant at Eureka and built the complete water works which now supplies that city. Seeking a broader outlet for his energies he moved to Seattle, securing a position with the Seattle Water Works. About this time electric railways and electrical lighting and power companies were developing rapidly in Seattle, and the young engineer decided to cast his lot with the electric industry. He became interested with the West Street and North End Electric Railway and displayed such remarkable talent as an executive that he soon was advanced to president and general manager of the company. He remained in that position for five years.

In 1901 Stone & Webster consolidated the various electric lighting and electric railway companies in Seattle and Tacoma, and Mr. Shuffleton entered the employ of this firm as superintendent in charge of all its engineering and construction work in the Northwest. In 1910 he was appointed Northwestern manager. In 1913 he was made Western manager in charge of all work on the division of construction and engineering in the western states. In recognition of his engineering accomplishments and administrative talents and of his sterling

S. L. Shuffleton standing at the throttle of the first of the eight new 125,000-hp. units in the Long Beach Steam plant.

qualities of character he was elected vice-president in 1925.

During the period of his association with Stone & Webster, Mr. Shuffleton has built hydro-electric and steam plants supplying energy to many cities on the Pacific Coast and has on two different occasions been called East to direct extremely difficult work which required an unusual amount of energy and resourcefulness for its successful completion. He has also acted in a consulting capacity in important projects all over the country and has acquired a nation-wide reputation as one of the country's outstanding engineers. His recent work for the Southern California Edison Company includes Long Beach Number 2 station, the first installation of two units aggregating 75,000 kw. capacity having been built in the record time of ten and one-half months.

California Body Reports on Utility Securities

The amount of public utility securities authorized by the California Railroad Commission during the fiscal year ending June 30, 1928, $218,559,617.57, fell below the amounts authorized in 1926-27, and in 1925-26, the totals authorized for those years being $314,642,213.92, and $262,463,149.26, respectively, according to the annual report of the department of finance and accounts of the commission.

The falling off in the amount of securities issued by California public utilities during the last fiscal period is ascribed largely to the fact that the large hydro-electric corporations have practically completed their major hydro-electric project financing. However, the report points out that the security authorizations of the fiscal years 1926-27 and 1925-26 were swelled abnormally because of three stock authorizations of extraordinary nature in the totals of those years, through the classification of their stock from $100 par value to $25 par value by the Pacific Gas and Electric Company, Southern California Edison Company, and Southern California Gas Company. Leaving these stock reclassifications out of consideration, the amount of securities authorized during 1927-28 was approximately at the same high level as that of the two preceding years.

The amounts of securities authorized for new construction during the last five years were as follows: 1927-28, $92,021,044.95; 1926-27, $137,191,630; 1925-26, $79,803,530.50; 1924-25, $148,027,069.89; 1923-24, $192,920,725.41.

In general, gas and electric companies have followed the plan of disposing of their stock through their own organizations, the report states. This method seems to have been uniformly successful in enabling the companies to sell their stock under advantageous terms and to reach a large body of customers. Reports filed by the gas and electric companies show approximately 220,000 stockholders at the close of 1927.

The report concludes: "The movement of consolidation of various properties continued on throughout the year and presented many interesting and important questions. In all these cases the commission has refused to consider the price paid for a public utility system as the basis for authorizing the issue of securities but has adopted as a basis the historical cost less accrued depreciation. In passing on these matters the commission first endeavors to ascertain whether the proposed consolidation is in the public interest and, second, if the terms are reasonable and proper. The amounts authorized to be issued for consolidations and reorganizations aggregated $60,187,504.16 for the twelve months ending June 30, 1928, as compared with $13,819,530 during the preceding twelve months period."

Four Men Complete Thirty Years' Service in Employ of Los Angeles Utility

Four members of the Los Angeles Gas and Electric Corporation's organization just recently have completed thirty years service with that company. They are C. S. Vance, vice-president, A. B. Forman, chief salesman, F. L. Washburn, salesman, and W. F. Brossmer, assistant foreman.

These four men began their service with the organization in 1898 and have steadily climbed the ladder in their own particular phase of work.

C. S. VANCE

F. L. WASHBURN

A. B. FORMAN

W. F. BROSSMER

Court Rules Utilities Commission Cannot Fix Rates of Municipal Plant

A DECISION has been handed down by the Supreme Court of Utah to the effect that the Public Utilities Commission of Utah has no right to regulate the rates charged by the municipal plant at Logan.

The commission had ordered that a lighting rate of 10 cents per kw.-hr. be charged by both the Utah Power & Light Company and the municipal plant. This ruling had followed complaints filed by the power company and by taxpayers of Logan based on the contention that the city plant should charge a rate sufficient to provide revenue to pay operating costs, set up sinking funds for bonds, pay interest and provide for depreciation, and that a 10-cent rate would be required to cover those charges. The commission had adopted this view and fixed the rate accordingly.

The case was carried to the Supreme Court, which ruled that whether the interest on bonds and sinking funds are to be met from taxes or from operating expenses rests with the city and not with the utilities commission. The court held that the police power of the state, conferred on the Public Utilities Commission to fix and determine rates, cannot be applied to municipal utility plants because such action would violate the constitution, which guarantees the right of local self-government.

Street Lighting Plans Approved—The proposed new street lighting system for Everett, Wash., which has been under consideration for months, has been approved by the City Council, and Sumner E. Paine, city engineer, has been authorized to proceed with the drawing up of specifications preparatory to calling for bids.

Two Washington Companies Joined by 110-kv. Line

With the actual physical connection of transmission lines of The Washington Water Power Company with those of the Puget Sound Power & Light Company between the Chelan power station of the former company and the Wenatchee substation of the latter. an exchange of power was made possible on Aug. 1. This new 110-kv. line was completed in July.

A contract providing 15,000 kw. was made operative on Aug. 1 to supply the Puget Sound system. The load will increase to 20,000 kw. in a year. The second 32,200-hp. unit of the Chelan station was placed in operation by The Washington Water Power Company a few days prior to the connection.

The second unit at Chelan now gives that station a rated generating capacity of 64,400 hp. and increased the total of the company's nine plants, all hydro, to a total of 252,450 hp.

California Power Project Planned on Yuba River

Permission to divert water at several points on the North and Middle Forks of the Yuba River has been granted the Yuba River Power Company, with headquarters in San Francisco, by the California Division of Water Rights. The water is to be used in the generation of power through a proposed development in east central California involving five power houses with an ultimate total capacity of 261,000 hp. at an estimated cost of $44,000,000. Eleven applications in all were approved by the water rights division, making possible the utilization of a total head of 7,000 ft. in the five plants.

No announcement has been made by the company as to its plans for construction of the plants or marketing of the power.

Foshay Buys Mt. Spokane Power Company

Another Washington power company changed hands about Aug. 1 with purchase of the controlling stock of the Mount Spokane Power Company, operating in Spokane and Stevens Counties, by the W. B. Foshay Company of Minneapolis.

The Mount Spokane company has three small hydro plants with a total capacity of 1,200 hp. and serves 900 customers in small communities, including Deek Park, Chattaroy, Springdale and Loon Lake, Wash. It was organized ten years ago by Mark F. Mendenhall, principal stockholder.

The sale was made through the Public Utilities Consolidated Corporation, a Foshay subsidiary, which last year purchased a group of distributing companies in northern Idaho. The sale terms and provisions were not announced. The valuation of the company has been placed at about $250,000.

Stewart Mountain Dam and Plant Work Under Way

Work is well under way on the Stewart Mountain dam and power house being built by the Salt River Valley Water Users' Association, Phoenix, Ariz. This development is the fouth of its kind that has been erected on the Salt River project, the others being the Roosevelt dam and power plant, the Horse Mesa dam and plant, and the Mormon Flat dam and plant.

The dam at the Stewart Mountain site, which lies between the Mormon Flat dam and the Granite Reef diversion dam, will be of the variable-radius arch type, with gravity section on the west end and overflow section on the east. It will be 180 ft. high above bedrock and 1,200 ft. long, over all, with a 400-ft. spillway. The reservoir created between the Stewart Mountain and Mormon Flat dams will be ten miles long, with a capacity of 70,000 acre-ft. The power house will have an installed capacity of 12,000 hp.

Under a contract entered into with the Central Arizona Light & Power Company of Phoenix the Salt River Valley Water Users' Association agrees to deliver to the power company 7,000 kw. firm power for a period of 50 years. The contract provides for a minimum payment by the power company of $240,000 per annum for the first 30 years.

An important feature of the Stewart Mountain development is the extension of the existing electrical distribution systems to make available electric service to all shareholders of the association on lands ratably within the project.

Gas-Electric Cars Ordered by Southern Pacific Co.

To give improved passenger service between San Francisco and points in San Mateo County, Calif., the Southern Pacific Company has announced that it has ordered several gas-electric cars to be used during the off-peak hours as a substitute for steam trains. The cars are expected to be delivered early in 1929.

These cars have a seating capacity of about 60, are equipped with a smoking compartment, and have sufficient power to carry additional coaches. They will equal the speed of present Southern Pacific interurban trains and will accelerate much more quickly.

The announcement of the use of the new equipment came as the result of a request of commuters that the company's surburban lines in San Francisco and San Mateo Counties be electrified and a downtown terminal established nearer to Market St. than the present one at Third and Townsend Sts. Paul Shoup, executive vice-president of the Southern Pacific Company, stated that electrification of all the company's peninsula lines and the expense of building a line to the vicinity of Market St. was not justified under the present volume of traffic.

Electrolytic Zinc Plant

This shows the new electrolytic zinc plant of the Sullivan Mining Company at Silver King, three miles from Kellogg, Idaho. The plant, which is expected to be placed in operation about Sept. 1, will be served by The Washington Water Power Company and when operating at full capacity will take about 10,000 kva. at corrected power factor.

Los Angeles and Edison Co. Settle Differences

An official statement issued Aug. 22 jointly by the Los Angeles Board of Water and Power Commissioners and the Southern California Edison Company announced that the two have arrived at an amicable settlement of their differences and that each will abandon litigation pending against the other.

One of the main differences between the two parties centered about a standby steam plant which the commissioners wished to build. The Edison company contended that the erection of such a plant would be in violation of a contract existing between the city and itself and obtained an injunction restraining the city from proceeding. In settlement of this dispute, according to the statement, "the company has agreed to provide and set aside for the service of the city, in lieu of the 25,000-kw. plant which the city itself proposed to construct, one of the 35,000-kw. steam units at the company's Long Beach steam plant No. 2, such unit to be isolated from the Edison system and to be directly and exclusively connected with the city at all times up to full capacity.

"By this means the city will acquire the steam plant service it needs without the investment of $3,500,000 for its own separate plant and also will save operating and maintenance costs of the proposed steam plant, amounting to more than $300,000 per year. Pursuant to this understanding, the board has made arrangements for the cancellation of contracts entered into by it some time ago for steam-plant machinery."

Two suits on this account are pending before the California Supreme Court but there they are "to rest indefinitely," it was stated.

A second controversy involved a claim by the water and power board for tax moneys from the power company and a counter-claim of the company against the board. In adjustment of this matter the company will pay $311,000, and the city will have the suit it filed dismissed.

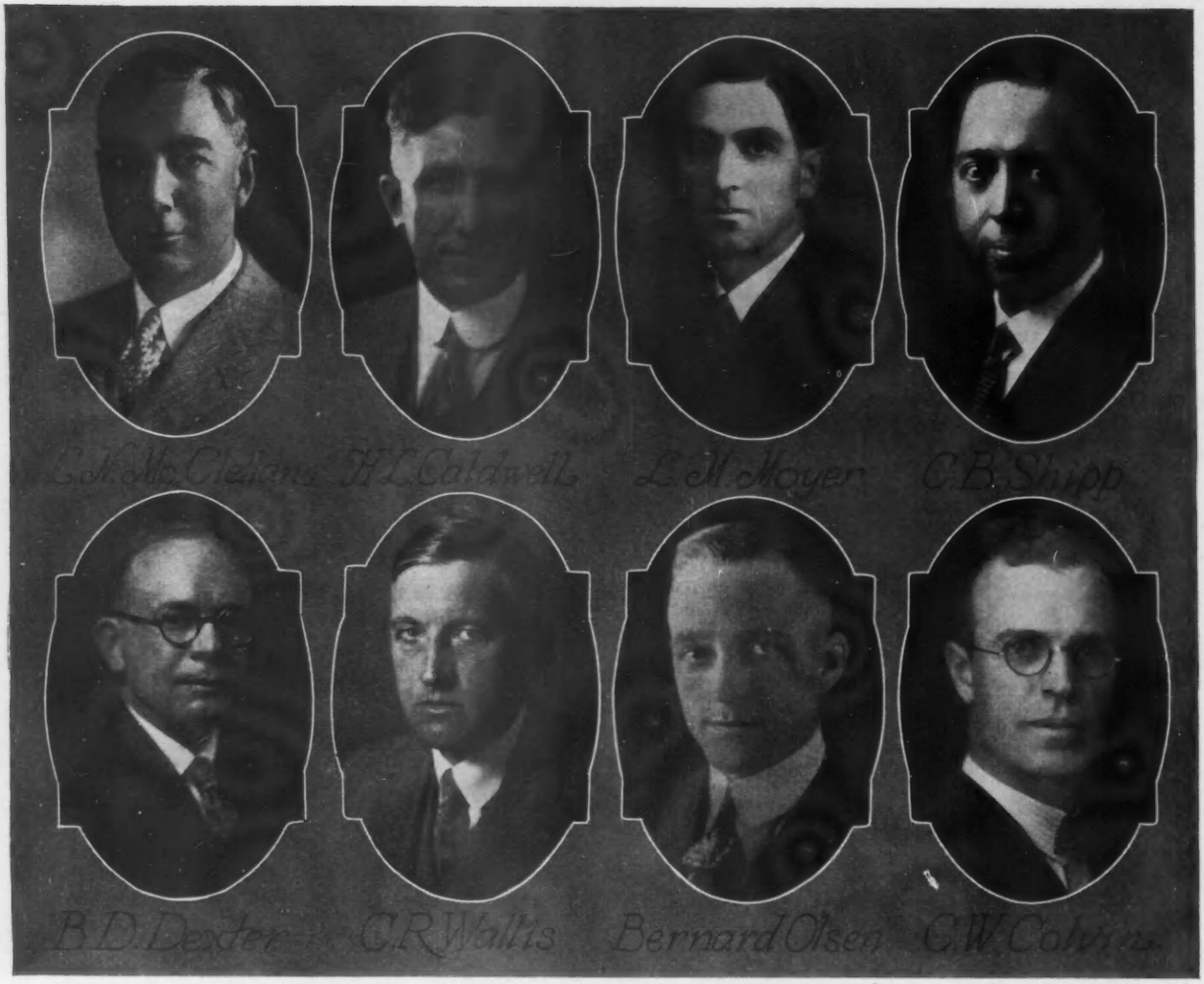
A third point of difference was concerned with the proper billing of the city for current bought of the company. In this two suits were involved. The company claimed approximately $900,000, of which the city admitted it owed $600,000 but disclaimed the remainder. Under the settlement the city acknowledges the company's original claim to be correct, the company will withdraw its suits and the city its counter-claims.

New Advertising Position Created by Company

FORREST M. RAYMOND

Forrest M. Raymond has been appointed superintendent of advertising, San Diego Consolidated Gas & Electric Company. For the past three years Mr. Raymond has edited the News-Meter, the company magazine, and has also assisted in the preparation of advertising and publicity data.

With the company's entry into the field of active merchandising, however, the new post has been created, and Mr. Raymond will now devote all his time to advertising.



Pacific Coast Section Officials, A. I. E. E.

ANNUAL elections have been held by all the various Pacific Coast sections of the American Institute of Electrical Engineers, and plans for the new administrative year are getting under way. Results of the elections in the different sections are given below:

Denver: chairman—L. N. McClellan, U. S. Reclamation Service; vice-chairman—W. H. Bullock, Westinghouse Electric & Manufacturing Company; secretary-treasurer—R. B. Bonney, Mountain States Telephone & Telegraph Company; **executive committee**—A. L. Jones, General Electric Company; V. L. Board, Public Service Company of Colorado; and W. H. Edmunds, Colorado & Southern Railway Company.

Los Angeles: chairman—H. L. Caldwell, Los Angeles Bureau of Power and Light; secretary—N. B. Hinson, Southern California Edison Company; assistant secretary—H. W. Hitchcock, Southern California Telephone Company; **executive committee**—E. L. Bettannier, Pasadena Municipal Light & Power Department; Prof. P. S. Biegler, University of Southern California; F. E. Dellinger, Los Angeles Gas and Electric Corporation; and David Hall, Westinghouse Electric & Manufacturing Company.

Portland: chairman—L. M. Moyer, General Electric Company; secretary-treasurer—H. H. Cake, Pacific States Electric Company; **executive committee**—C. W. Fick, General Electric Company; Tom Perry, Northwestern Electric Company.

Salt Lake City: chairman—C. B. Shipp, General Electric Company; secretary—A. C. Kelm, Utah Power & Light Company; **executive committee**—W. F. Craig, Westinghouse Electric & Manufacturing Company; L. B. Fuller, Utah Power & Light Company; J. A. McDonald, General Electric Company; and H. E. Weiss, Allis-Chalmers Company.

San Francisco: chairman—B. D. Dexter, Pacific Gas and Electric Company; secretary—A. G. Jones, General Electric Company; **executive committee**—Dr. L. A. Fuller, General Electric Company; G. R. Henninger, Electrical West; Roy Wilkins, Pacific Electric Manufacturing Corporation; and W. D. Scott, Pacific Telephone & Telegraph Company.

Seattle: chairman—C. R. Wallis, General Electric Company; secretary-treasurer—R. Rader, Puget Sound Power & Light Company; **executive committee**—C. E. Carey, Westinghouse Electric & Manufacturing Company; J. Hellenthal, Puget Sound Power & Light Company; Prof. E. A. Loew, University of Washington; C. E. Mong, The Pacific Telephone & Telegraph Company; and C. J. Hawkes, Electric Storage Battery Company.

Spokane: chairman—Bernhard Olsen, General Electric Company; vice-chairman—Joseph Wimmer, Pacific Telephone and Telegraph Company; secretary-treasurer—H. L. Vincent, General Electric Company; **executive committee**—C. B. Carpenter, W. S. McCrea, Jr., and J. S. McNair, all with The Washington Water Power Company.

Vancouver: chairman—C. W. Colvin, British Columbia Electric Railway Company, Ltd.; secretary—J. Teasdale; **executive committee**—G. R. Wright, Canadian General Electric Company; Dr. H. Vickers, University of British Columbia; and A. C. R. Yuill, consulting engineer.

News Briefs

Utility Regulation Chart—Bonbright & Company, Inc., 25 Nassau St., New York City, have prepared a chart which purports to cover the constitutional and statutory provisions of law characteristic of each state, specifically conferring power on the state commission to regulate public utilities, with particular reference to electric light, heat and power companies and gas companies. It was prepared for Bonbright & Company by J. D. Van Wagoner and T. R. Hawley of the New York bar, under the general supervision of Carl D. Jackson, counsel to the N.E.L.A. and the American Gas Association, and Winthrop, Stimson, Putnam & Roberts, the company's counsel, largely from the Bonbright Index-Digest of Public Utility Regulatory Laws, which was prepared by the same persons.

"Electric Lights for Increasing Egg Production"—Under this title the Agricultural Experiment Station of the Oregon State Agricultural College at Corvallis has published Station Bulletin 231 giving the results of an investigation conducted to determine full-year returns from lighted and unlighted pens of pullets and hens. The preparation of this bulletin and the experimental work upon which it is based was done in co-operation with the Oregon Committee on the Relation of Electricity to Agriculture. The bulletin was written by George W. Kable, experiment station agricultural engineer and project director of the Committee on the Relation of Electricity to Agriculture; F. E. Fox, associate professor of poultry husbandry, and A. G. Lunn, professor of poultry husbandry and head of the poultry department.

Newspaper Investigates Boulder Dam Project—During June, 1928, the San Francisco Bulletin printed daily a series of articles on the Boulder Dam project. These articles were written by Gilman Parker, a regular member of the staff, who was sent to southern California, Arizona and Mexico to ascertain the facts. The series now has been published in booklet form, and copies may be obtained from the San Francisco Bulletin at 10 cents each.

Civil Service Examinations for Draftsmen—Open competitive examinations for senior electrical draftsman, electrical draftsman, assistant electrical draftsman and junior electrical draftsman are soon to be held by the United States Civil Service Commission. Application must be on file with the commission at Washington, D. C., not later than Sept. 12. The entrance salaries are $2,000, $1,800, $1,620 and $1,440 a year, respectively.

City Must Build Fish Ladder If it Develops Power Site—Notice that if the City of Sandpoint, Idaho, develops a proposed power site on the Priest River it must install a fish ladder at an estimated cost of $40,000 has been served on the city by R. E. Thomas, state game warden of Idaho. The board in Sandpoint recently authorized $1,000 more to be paid on the site and $3,000 for preliminary plans. The Sandpoint community is served by the Mountain States Power Company.

Plans to Be Drawn for Seattle Lighting Department's New Building—V. W. Voorhees, an architect with offices in the Lloyd Building, Seattle, has been authorized by the City Council to prepare plans for the city lighting department's projected $500,000 building to be erected at Third Ave. and Madison St. The structure will cover a half block, will have two basements, and will be three stories high. Foundations and walls will be strong enough to carry ten future floors.

Damage Suits Filed Against City of Los Angeles—Up to Aug. 18, 38 damage suits had been filed against the City of Los Angeles for loss of life and injuries resulting from the failure of the St. Francis dam March 12. The total of damage asked in the complaints amounts to $1,950,000, according to press dispatches.

Conflicting Applications Before Federal Power Commission—The Federal Power Commission has pending conflicting applications between the Yosemite Power Company and the Turlock and Modesto Irrigation Districts on the Tuolumne River in California. The private company has applied for a license covering a project in which it has been actively interested for fifteen years and which has been before the power commission for seven years. The irrigation districts applied for a preliminary permit less than two years ago. Conclusions have not been announced as yet in this case, but it appears probable that the commission will not fail to accord to the irrigation districts the full measure of preference that municipalities have received in the other cases.

Plans New Generating Plant—Permission to construct, maintain and operate a new hydro-electric generating plant of 800-kw. capacity on the Virgin River, near the town of La Verkin, in Washington County, Utah, has been asked by the Dixie Power Company, in an application filed with the Public Utilities Commission of Utah. The estimated cost of the proposed new plant is $90,000.

Ornamental Lighting Systems—The Seattle City Council has passed an ordinance providing for construction of an ornamental lighting system in West Seattle at a cost of $115,000. More than six miles of street lighting with two-lamp standards will be installed. The City Council of Vancouver, Wash., also has passed a resolution providing for the extension of its ornamental lighting system for fourteen blocks, a part of a 40-block lighting installation which is now under way.

Coal Mines to Be Electrified—Preliminary work leading up to the complete electrification of its Michel and Coal Creek collieries in the East Kootenay district of British Columbia has been started by the Crow's Nest Pass Coal Company. This company is the largest coal operator in British Columbia, producing between 800,000 and 900,000 tons of coal annually. The East Kootenay Power Company, Fernie, B. C., will supply the current.

Franchise Granted for Electric System—Clallam County commissioners have granted to Glenn Fulkerson, Clallam Bay, Wash., a franchise to erect poles and string wires for an electric system for that town.

Pacific Coast Electrical Association

Commercial Section to Hold Conclave Sept. 27-28

Work of the Commercial Section of the Pacific Coast Electrical Association will get under way at the first conclave of the current association year to be held at the Fairmont Hotel, San Francisco, Sept. 27-28, 1928. The program will include two open meetings and two half-days of committee sessions.

The conclave will open Thursday morning at 10 a.m. with an address by P. M. Downing, president of the association. J. F. Pollard, chairman of the the section, will report upon the meeting of the Commercial National Section executive committee meeting held in Chicago in August.

Friday afternoon will be devoted to a joint open meeting with the Advertising-Publicity Section, similar to the one held in San Francisco in October of last year. The program for this meeting will include addresses on commercial development and load-building by one of the chief executives of a California utility and the commercial manager of one of the Intermountain central stations. The Advertising-Publitcy Section will be represented by an address on "What Shall We Adver-

tise?" to be given by one of its members. Chairman Pollard will preside over this meeting.

Committee meetings Thursday afternoon and Friday morning will be directed by Walter Carlson, chairman of the lighting bureau, P. P. Pine, chairman of the power and heating bureau; Ward Schafer, chairman of the general bureau; and Henry Rice, chairman of the merchandising bureau.

Conclave of Engineering Section Sept. 19-21

The first conclave of the Engineering Section, P.C.E.A., of the new association year will take place at the Clift Hotel in San Francisco, Sept. 19-21. A special luncheon meeting will be held on Thursday, Sept. 20, at which Paul M. Downing, vice-president in charge of electrical construction and operation, Pacific Gas and Electric Company, will deliver the main address.

Another important feature of the Engineering Section conclave will be the joint meeting with the San Francisco Section of the American Institute of Electrical Engineers on Friday evening, Sept. 21. The subject under discussion will be "Transmission System Stability," and the principal speaker will be R. H. Park, engineer, General Electric Company, Schenectady, N. Y.

Appointment of N.E.L.A. Official Personnel

While the official personnel of the National Electric Light Association under the new administration is not entirely complete, announcement has been made of those appointments that have been made so far.

These include the selection of Marshall E. Sampsell, Central Illinois Public Service Company, Chicago, as chairman of the Commercial National Section; E. C. Stone, Duquesne Light Company, Pittsburgh, as chairman of the Engineering National Section; and J. F. Owens, Oklahoma Gas & Electric Company, as chairman of the Public Relations Section.

Among the Western men who have been chosen to fill important posts in the national organization are D. C. Green, vice-president and general manager, Utah Power & Light Company, Salt Lake City, who will serve as one of the three vice-chairmen of the Public Relations National Section; R. H. Ballard, president, Southern California Edison Company, Los Angeles, who will continue as chairman of the public policy committee; and John P. Coghlan, second vice-president, Pacific Gas and Electric Company, San Francisco, who has been named a member-at-large of the national executive committee.

Women's Committee Chairman Reappointed—Mrs. Ruth E. Creveling, librarian and editor of The News-Meter, San Diego Consolidated Gas & Electric Company, who served so successfully as chairman of the women's committee, P.C.E.A., during the past year, has been re-appointed to that position for this year. The appointment was made by the new chairman of the Public Relations Section, A. B. West, president, The Southern Sierras Power Company, Riverside, Calif.

Transportation Section to Meet—Sept. 21-22 are the dates set by the Transportation Section, P.C.E.A., for its next meeting, which will be held in the San Joaquin Power Building, Fresno.

Northwest Electric Light & Power Association

Report Shows 481 Employees Took Part in Contests

Summarizing the results of the three essay contests conducted during the last association year by committees of the Public Relations Section of the Northwest Electric Light & Power Association, George L. Myers, section chairman, has presented figures giving the extent of participation by the emproyees of member companies. The report shows that a total of 481 employees from eleven companies took part in the contests.

In the contest on "Employees as a Factor in Public Relations," conducted by the committee on employees' relations with the public, 256 employees in eleven companies were entered. The Eastern Oregon Light & Power Company, Baker, Ore., showed the highest percentage of entries, with the Pacific Power & Light Company, Portland, second, and the Utah Power & Light Company, Salt Lake City, third.

Sixty-six employees from six companies participated in the contest on "Why Our Customers Should Be Our Partners," conducted by the customer-ownership committee. The Pacific Power & Light Company was the leader in this contest, with The Mountain States Power Company, Albany, Ore., second.

The greatest participation was found in the women's committee contest on "The Woman's Role in Public Relations," in which 25 per cent of all the women employees of the eleven companies submitted essays. The Eastern Oregon Light & Power Company again led with over 50 per cent participation; The Mountain States Power Company was second with slightly less than 50 per cent; and The Washington Water Power Company, Spokane, registered third with 33 per cent.

Books & Bulletins

ELECTRIC POWER TRANSMISSION

By E. A. Loew, professor of electrical engineering, University of Washington, Seattle. First edition; 6 x 9 in.; cloth; 388 pages; 104 illustrations; 40 tables. Published 1928 by McGraw-Hill Book Company, New York; for sale by Technical Book Shop, 883 Mission St., San Francisco. Price $4.

This treatise on transmission line calculations by Professor Loew is a contribution of appreciable value to engineers and advanced students in electrical engineering. The point of view taken by the author is that of an engineer with certain practical conditions at hand from which the complete design is to be made including tower type and spacing, as well as conductor size, material, spacing and other important elements. The outstanding characteristic of the work is that it is done in an exceedingly thorough and rational manner. The author does not side-step either technical or economic problems by leaving these to "judgment" when it is possible definitely to formulate them by mathematical means. To get the full benefit of the book the reader must have a speaking acquantance with the hyperbolic functions and differential equations, although the author puts down the derivation of all of his equations quite fully and thus it is necessary only to follow his analyses.

Most engineers dealing with important transmission lines should be able to make use of the methods evolved in this book. They are thoroughly modern and practical of application. The text should serve equally well for an advanced course in electrical engineering as it is particularly good for students to study at least one subject quite fully.

In the field of very high voltage transmission of power it is quite probable that hollow or reinforced conductors will be used and in such cases the cross-sectional area is not proportional to the square of the diameter. In this particular the equations developed by Professor Loew leading to the selection of conductor size are not directly applicable since he assumes a fixed relation between diameter and cross-section. For present-day practice this limitation is not a serious one.

As the author points out in his preface, exact methods as developed in the book are practically as readily applied as some approximate methods. This is particularly true when means are provided for getting at values for terms involving hyperbolic functions and for simplifying calculations by the use of convenient charts. Charts, diagrams, and tables all are developed for the convenience of the reader of this book. Illustrative problems are worked out in sufficient detail to make very clear the application of important formulas.—P.S.B.

Meetings

Coming Events

American Institute of Electrical Engineers, San Francisco Section—Joint meeting with Engineering Section, P.C.E.A., Clift Hotel, Friday evening, Sept. 21, 1928.

California Electragists—State convention at Hotel Fresno, Fresno, Calif., Oct. 20, 1928.

California Association of Electrical Inspectors—Annual convention in Sacramento, Calif., Oct. 25-27, 1928.

Electrical Trade Show—In Grand Central Palace, New York City, Oct. 17-19, 1928.

International Association of Electrical Inspectors—Annual meeting of Western Section in Denver, Colo., Sept. 10-12, 1928.

Illuminating Engineering Society—Annual convention at King Edward Hotel, Toronto, Ontario, Sept. 17-20, 1928.

Pacific Coast Electrical Association—Commercial Section Conclave—Fairmont Hotel, San Francisco, Sept. 27-28, 1928.

Advertising-Publicity Section—Fairmont Hotel, San Francisco, Sept. 28, 1928.

Engineering Section—Clift Hotel, San Francisco, Sept. 19-21, 1928.

Transportation Section — San Joaquin Power Building, Fresno, Sept. 21-22, 1928.

Rocky Mountain Division, N.E.L.A.—Colorado Utilities Association—Joint annual convention at Hotel Colorado, Glenwood Springs, Colo., Sept. 17-20, 1928.

Public Ownership League Criticizes "Power Trust"

Criticism of the "Power Trust" and presentation of the accomplishments of municipal ownership occupied the major portion of the program of the meeting of the Public Ownership League of America held July 23-26. Some 200 delegates were present at the sessions held in Seattle on July 23 and 25, which were presided over by Carl D. Thomson, Chicago, long active in the league. On July 24 the delegates were transported to the City of Seattle's Gorge plant on the Skagit River for a tour of inspection of the Skagit development, and on July 26 a similar trip was made to the City of Tacoma's Cushman project.

During the business sessions delegates discussed operation under municipal ownership in different parts of the United States. Complete reports were made by J. D. Ross, superintendent of the City Light Department, Seattle, Llewellyn Evans, Tacoma, and J. W. McArthur, Eugene, Ore. In general, delegates reporting on the operations of their municipal systems referred to lowered rates and large savings to customers, although a few stated that they could not report a saving to consumers.

In the course of his remarks Carl D. Thompson made a plea that the government-owned plants (Muscle Shoals and possible future developments) be tied in with all the municipal plants, and that from these systems lines be extended to the farmers to bring cheap power to agriculture. The major portion of his talk centered about his announced subject, "The Power Trust Exposed," in which he reviewed the findings of the Federal Trade Commission investigation.

Willis J. Spaulding, Springfield, Ill., president of the league, recited figures tending to show that the municipal ownership advocates are "recapturing a public function which has been appropriated by private monopoly."

J. D. Ross gave the history of municipal development of power in Seattle, making a number of comparisons in municipal and private operation favorable to the former.

C. C. Dill, United States Senator from Washington, discussed the national aspects of the development of power by the government, referred to the Walsh resolution and averred that the most powerful lobby in history diverted the investigation of the power business from the Senate to the Federal Trade Commission.

State regulation had failed to regulate rates, alleged Homer T. Bone, Tacoma, and added, "The only way to regulate rates is to build your own plant." He made a number of comparisons between Tacoma rates and those of surrounding cities, with particular emphasis on rural rates, in the making of which he accused private companies of imposing an undue burden on the farmer.

A resolution indorsing the Swing-Johnson Bill and urging an early and favorable consideration of it by the next Congress was passed over the protest of a delegate from Arizona, after a heated debate.

Oregon C.R.E.A. to Continue Research and Dissemination of Information

The program of work for 1928-29 of the Oregon Committee on Relation of Electricity to Agriculture, as outlined and passed at the recent annual meeting of the committee, includes activity in three departments of the committee's scope: investigation and research, publication of findings, and dissemination of information about farm electrification. Refrigeration and arc lamps for poultry lighting will occupy first place in the field of investigation and research, while a school for rural service men and general co-operation with rural service departments of utility companies will be the principal media for placing information about the work of the committee into the hands of those best able to relay it to the farmers. Publication of the results of investigation on electric brooders, feed grinders, farm hoists, hop drying and prune drying was provided for at the meeting.

The investigation of refrigeration will have as its purpose the determination of a practical design of a convenient box of reasonable cost and large capacity for the storage of general farm produce. Further, besides investigating the use of arc lamps for lighting laying houses, experiments also will be made in the development of a small green feed and straw cutter, and in the use and economics of dairy water heaters and sterilizers.

Stating the belief that there are certain problems of farm electrification throughout the United States that can best be investigated by some national agency, the Oregon C.R.E.A. took action recommending that the national C.R.E.A. give consideration to the following: the use of electricity for field power, soil treatment by means of the Roe plow and different methods of electroculture, study of the probable effect of electricity on farm organization and management, and the working out of a rural electrification plan involving the various interested agencies.

The 1928-29 program of the committee is outlined in Progress Report No. 13, issued by George W. Kable, project supervisor.

Joint Meeting Celebrates Radio Show Opening

In celebration of the opening of the fifth annual Pacific Radio Exposition at the Auditorium a special radio day program was presented at the meeting of the San Francisco Electrical Development League in the Palace Hotel on Aug. 20. At this meeting the league combined with the Pacific Radio Trade Association and the Music Trades Association of Northern California in featuring radio and in extending an invitation to the electrical industry to see the Radio Show, which was held during the week of Aug. 18.

Arthur H. Halloran, president of the Electrical Development League, opened the meeting and introduced the chairman of the day, Don Gilman, Pacific Coast manager of the National Broadcasting Company. After short speeches by W. E. Darden, chairman, Pacific Radio Exposition, and Shirley Walker, president of the Music Trades Association of Northern California, the chairman presented Ernest Ingold, president, Pacific Radio Trade Association and chairman of the musical program. Mr. Ingold in turn introduced Max Dolin, director of the National Broadcasting Company's orchestra, which rendered four excellent numbers.

A special feature of the program was the appearance of Miss Suzanne Keener, coloratura soprano, formerly of the Metropolitan Opera Company, who graciously sang several selections, a number of them in costume. Miss Keener was accompanied by Edward Harris, pianist.

Contractors, Dealers and Inspectors

Electragist Meetings—National and State

National Constitution Changes and Policies Will Determine California Association October Meeting Procedure

CHANGES were effected in the constitution of the Association of Electragists, International, at the Chicago convention, Aug. 6-10. These changes will have a material reaction on the status and organization set-up of all local associations. This situation brings about a crisis in the affairs of the California Electragists of such extent that the annual convention in October will be changed completely in its plan, duration and program. This was the word given out by the officers of the California association upon the return of the delegation from the Chicago convention.

"As the matters to be discussed at the California Electragists' convention are to be limited entirely to contractor problems," said C. J. Geisbush, state manager, "we will not ask other branches of the industry to sit in with us at this convention. These problems concern themselves with changes in dues, changes in relationship to the international association, changes in the educational program of the association for its members as well as intimate credit, trade policy and technical problems peculiar to the contracting business."

"Blue Shirt" California Convention

It is also planned to eliminate all formality and entertainment features in order to shorten the meeting time to one day of intensive work. The date has been set tentatively for Oct. 20, at the Hotel Fresno, Fresno, Calif.

"This will be a 'blue shirt' convention," continued Mr. Geisbush. "We will wear old clothes and come dressed for work. The number and the seriousness of many of the problems to be discussed in the short space of time will make it necessary to cut out all frills. No entertainment is being planned, not even for the ladies, although they may attend if they are interested in the business to be discussed."

The convention, according to present plans, will be started early Saturday morning, Oct. 20, and continue all day and evening. If further meetings are necessary to finish up business, short meetings may be conducted Sunday morning.

The state Motor Section will hold a parallel meeting with the electrical contractors at the same time. Frank Sievers, named chairman of the National Motor Section, will then report on the activity of the motor men at the Chicago convention seeking to arrive at motor franchise agreements with manufacturers which would be satisfactory to both parties.

Significant Changes

The particular action taken at the Chicago convention which affects the policy of the association and which may find its reflection in the California association is the result of long study and proved necessity. The primary change was made by means of an amendment to the constitution setting the national dues at a standard $15 per year. This will require from California members a different arrangement from that now in force.

"Hobe" Barnes, former Southern Division secretary, who had charge of many arrangements at the Chicago convention as assistant to Manager Larry Davis.

Another impending matter is the change contemplated in the work of the association. Until now the association has conducted a number of self-educational activities, such as accounting, estimating, cost data, publication, liability insurance, etc. Arrangements are under way whereby many of these activities may be underwritten and carried on jointly by other branches of the industry, possibly through the Society for Electrical Development. The Association of Electragists, International, thereby would concentrate its efforts solely upon policy relationships between contractors and other branches of the industry, government bodies, related trade groups, etc. Just what effect such a change may have upon the California association situation must be determined by the members.

West Plays Important Part

The West played an important part in the convention, not only in the leadership of President Clyde Chamblin, but in participation in meetings, references to plans and policies in force in California and the Northwest, and in its influence in thinking out methods of approaching problems.

One of the principal speakers was E. O. ("Bill") Shreve, formerly San Francisco district manager of the General Electric Company, now manager of the industrial department of the same company at Schenectady. He spoke on the motor distribution situation, outlining the manufacturers' side of the problem.

In an excellent paper on "Credit and Credit Policies," F. P. Vose, secretary National Electrical Credit Association, referred to utterances of President Chamblin and of James O'Reilly (see Electrical West, May 1, 1928, p. 259) on the subject, and commended these men for straight thinking along sound financial lines.

Philip Cabot, economist, Graduate School of Business Administration, in a paper read by Dean Mallot, of the faculty of that college, in analyzing the question of central station competition with contractor-dealers in both the wiring and merchandising aspects of the situation, paid high tribute to the "Through-the-Dealer" plan of merchandising employed by the Valley Electrical Supply Company, Fresno. This plan had previously received the endorsement of both the California Electragists and the international association in former conventions.

Frank Sievers, of Coney & Kuchel, San Francisco, representing the Northern Division Motor Section, because of his championship of a reasonable and constructive policy with regard to motor distribution franchise agreements, was selected as chairman of the national section to follow through with this activity.

Many of the policy problems, as well as details of other phases of the Chicago convention will be discussed and reviewed at the California association meeting in Fresno.

California delegates at Chicago felt very much at home on finding H. W. ("Hobe") Barnes, formerly assistant secretary, Southern Division, and now assistant to the managing director, Larry Davis, in charge of many of the convention arrangements. These delegates report "Hobe" making fast headway in his new work, assuming more and more responsibilities invested in him by Mr. Davis, and winning friends as he always did in California by his sincerity and straightforwardness.

McGraw Contractor Award Made at Convention

The Contractor-Dealer medal and purse for 1928, under the James H. McGraw Award, was presented at the convention of the Association of Electragists, International, at Chicago, to N. J. Biddle of Detroit.

In the citation accompanying the medal giving the reasons for its presentation, Mr. Biddle, manager of the association of Electragists of Detroit, it was stated, was awarded the medal "on account of his constructive work in establishing credit relationship between electrical wholesalers and contractor-dealers by the inauguration of this plan which has been in successful operation for two years." The citation con-

tinues: "As a result the financial condition of the Detroit contractors has been greatly improved, the number of irresponsible contractors has been reduced almost one-half, the total of past due receivables on the books of wholesalers has shrunk one-third and the contracting trade is generally in a far more prosperous condition."

Certificate of honorable mention was awarded to Earl N. Peak, president of the Marshall Electric Company, of Marshalltown, Iowa, and president of the Iowa Association of Electragists. The citation specifically mentions his constructive work in behalf of the establishment of a joint committee of the electrical industry of Iowa representing the power companies, manufacturers, jobbers, contractors and dealers of that state, of which he is the chairman.

Oregon Electragists Discuss Pertinent Problems at Annual State Convention

A TALK on window lighting with demonstration, a presentation of the contractor's rights under the lien laws, and a practical working out of problems in estimating were the principal features of the second annual convention of the Oregon Electragists held at the Multnomah Hotel, Portland, Aug. 18, 1928. At this meeting, to which came 50 representatives of the Electragists and associated interests, the present state organization celebrated its first anniversary, recording a healthy growth and a substantial headway toward the solution of problems to mutual advantage.

New officers elected for the coming year yere:

President—Frank L. Robinson, H. & S. Electric Company, Le Grande; vice-president—C. D. Garcelon, Electric Shop, Klamath Falls. J. R. Tomlinson, Portland, was re-elected secretary, and no change was made in the executive committeemen consisting of Roy C. Kenney, manager, NePage-McKenny Company, Portland, for District No. 1; Basil Witzig, Corvalis, for District No. 2; D. D. Van Fleet, Klamath Falls, for District No. 3; and Tran Alfrey, Baker, for District No. 4.

Stating that inadequate window lighting is an economic waste, and only the best lighting could yield returns to the merchant by drawing business to his store, Charles Pryal, Sr., illuminating engineer, Portland Electric Power Company, Portland, urged the contractors not to attempt to cut down window lighting specifications to cheapen the wiring so as to get the job. He showed how the power companies were doing all they could to induce merchants to use adequate lighting, and invited the contractors to make use of the service rendered by the illuminating engineering departments of the companies for laying out lighting plans and drawing specifications, when any of the contractors should have a prospect. He gave a demonstration of window lighting showing the development in the art from the time when eight foot-candles were considered sufficient to the present time, when more than 100 foot-candles frequently are required. He also demonstrated the use of modern equipment for blending colors in window lighting.

The steps in estimating, as advocated by the A.E.I., with the use of the forms provided for the purpose, were explained by Wesley S. Grasle, Knight Electric Company, Portland. A blackboard was used to simpify the explanation, and to work out hypothetical problems. This lead to a discussion of how to figure overhead and what overhead items must be considered. These items as given by M. A. Priesz, accountant, Portland, were as follows: supervision, office salaries and expenses, rent, auto expense, general expense, advertising, dues and subscriptions, depreciation, bad debts, taxes and interest.

The Oregon lien law was discussed by George W. Herron, secretary. Building Material Dealers' Credit Association, Inc., Portland, who told of the service rendered to members by his association in examining abstracts and handling other legal formalities in connection with the use of the law. He stated that the use of the law permitted the contractor to take on business not otherwise possible, and to keep bad debts at a minimum. The movement on foot in the Department of Commerce of the United States to draft and have adopted in all states a uniform lien law would, he said, bring about an improvement in the situation.

George B. Herrington, executive secretary, Associated General Contractors of America, Portland, stated that one of the principal activities of the A.G.C. was to iron out the differences existing between the general contractor and the sub-contractors. He stated that conditions in Portland were fairly satisfactory in this respect but that his association in Detroit in one year reduced the number of contractors by 259, and the volume of unpaid accounts by 66 per cent.

At the business meeting held in the morning, O. R. Bean, of the firm of Lawrence & Holford, architects, Portland, and vice-chairman of the Oregon Building Code Committee, recently appointed by the governor to draft a building code to be presented to the legislature in January, discussed the possibility of including an electrical code in the general building code. The Oregon Electragists' code committee is prepared to introduce separately its own code law if a satisfactory electrical code cannot be included in the general building code of the state.

At the banquet on the evening of Aug. 18, to which the ladies had been invited, and which was attended by 130, the principal speaker was A. C. McMicken, general sales manager, Portland Electric Power Company, Portland, taking the place of Franklin T. Griffith, president, who was prevented from attending by illness. Mr. McMicken presented the electric utilities' side of the present investigation carried on by the Federal Trade Commission, urging those present to be slow to condemn the power companies for alleged iniquities played up by a portion of the press of the country without realizing that there is another side to the question which is not being brought out in the investigation. Roy C. Kenney acted as toastmaster.

As announced on the program, the "bitter feud" between the jobbers and the contractors was resumed on the Multnomah Club golf course on Aug. 19, where a twelve-man team of the contractors defeated a like number of the jobbers, thereby retaining for another year the silver loving cup donated by the Electragists as a perpetual trophy for the event. Eight individual prizes were donated for low net scores.

The convention committee consisted of the following: general chairman—Harold Parrott, Morrison Electric Company; finance—B. Huenergard; entertainment—W. H. Emerick; and golf—E. L. Knight, all of Portland.

California Inspectors Set Sacramento Date

Date for the California Association of Electrical Inspectors' convention at Sacramento has been definitely set for Oct. 25, 26 and 27, according to Claude W. Mitchell, secretary, after conference with Carl Beaton, president. All entertainment features are in the hands of the Sacramento Valley Electrical Development League and program arrangements are under the direction of Mr. Mitchell and Mr. Beaton. Efforts are being made to have a number of prominent national inspection authorities attend the California convention after the international convention at Denver. Full details of program and arrangements are promised for the next issue of Electrical West.

Bert Bennett, well known in northern California electrical circles as salesman for the Pacific States Electric Company, recently bought out both the **Dunsmuir Electric Works**, at Dunsmuir, Calif., and the **Tex Electric Company**, of Weed, Calif., consolidating them under the name of the **Siskiyou Electric Company**, with headquarters in the Security Bank Building, Dunsmuir. Mr. Bennett formerly made his headquarters at Chico. He has long been an active booster of Red Seal standards and assisted dealers in his territory in improved merchandising and window display methods.

Personals

To Direct Arizona Utilities Association Affairs

AT THE recent convention of the Arizona Utilities Association in Prescott, Max A. Pooler, vice-president and general manager of the Tucson Gas, Electric Light & Power Company, was chosen to administer the association's affairs for the coming year.

Mr. Pooler's career has centered about power company activities since 1905 when, after a post-graduate course at Purdue University, he became superintendent of a gas and electric company at Newcastle, Pa. He remained there for nine years and then joined the Potomac Edison Company, Hagers-

MAX A. POOLER

town, Md., as general manager. He held that post until 1922. At the end of that period he was made vice-president and general manager of the New Brunswick Power Company, St. John, where he remained four years. His next step covered a lot of territory, for he left Canada to become vice-president and general manager of the Tucson Gas, Electric Light & Power Company. Mr. Pooler has been associated directly or indirectly with Sanderson and Porter in the Federal Light & Traction Company since 1905.

The new executive secretary of the Arizona Utilities Association is Lee C. McCullough, who succeeded to the post upon the resignation of Milton G. Sanders, commercial manager of the Arizona Edison Company, Phoenix. Mr. McCullough, who is also secretary of the Arizona Industrial Congress, entered the public utility field by becoming cashier of the Southwestern Telephone & Telegraph Company of Oklahoma City in 1908. He retained that connection for eight years, becoming successively cashier and assistant manager and assistant district manager and cashier. Then the World War came, and Mr. McCullough served as a lieutenant in the American Army for two years, one of them in France. Later on, after his return to civilian life, he did some special work for the Mountain

LEE C. McCULLOUGH

States Telephone & Telegraph Company in Phoenix, and then in 1924 became secretary of the Arizona Industrial Congress.

The association is an active one, and its members are looking forward to a year of still greater progress under such able leadership.

Maurice A. Oudin, vice-president, International General Electric Company, Inc., has been decorated by the King of Italy with the Order of Commander of the Crown of Italy in recognition of his good offices in behalf of a closer international relationship and of the specific benefit to the engineering profession of Italy. Mr. Oudin has devoted many years to the fostering of this country's relations with other nations, and a few years ago was decorated with the Order of the Rising Sun by the Emperor of Japan.

H. T. Plumb, General Electric Company, Salt Lake City, not long ago visited in Denver where he gave several lectures.

W. H. Onken, Jr., editor, Electrical World, New York, attended as a representative of the American Institute of Electrical Engineers the dedication of the Louvain Library and Engineers' Memorial in Belgium. Later in Paris as a representative of the National Electric Light Association, he attended the convention of the Union Internationale des Producteurs et Distributeurs d'Energie Electrique.

Blake R. VanLeer, assistant professor of mechanical engineering, University of California, Berkeley, has been appointed assistant secretary of the American Engineering Council. Mr. VanLeer has degrees from Purdue and California Universities. He served with the 316th Engineers in France and was one of the first of those selected to go to Europe under the Freeman hydraulic laboratory scholarship.

E. A. O'Leary, chief clerk, Arizona Edison Company, Douglas, Ariz., recently returned from an extended trip to St. Louis and other Eastern cities.

H. W. Hitchcock, formerly outside plant and transmission engineer for the Southern California Telephone Company, Los Angeles, has been made chief engineer of that company. The promotion makes him chief engineer in the southern California area for the Pacific Telephone & Telegraph Company. Mr. Hitchcock succeeded **F. N. Rush**, who recently became vice-president and general manager for the Southern California Telephone Company.

Roy T. Richards, operating superintendent, Central Arizona Light & Power Company, Phoenix, recently returned to that city from a trip to the Pacific Coast. While away he visited the Portland Gas & Coke Company, Portland, Pacific Gas and Electric Company, San Francisco, and the San Diego Consolidated Gas & Electric Company, San Diego.

Mrs. Lucille Ramirez is the new home economist for The Washington Water Power Company, Spokane, succeeding Miss Louise Leslie, resigned.

Arthur Johnson, formerly connected with The Washington Water Power Power Company, Spokane, has resigned to accept a position as junior engineer with the water resources branch of the U.S. Geological Survey, with headquarters in Tacoma.

Maj. Glenn E. Edgerton, chief engineer, Federal Power Commission, has been made a member of the Board of Engineers for Rivers and Harbors. He will fill that place in addition to his other duties. This is a step looking to the co-ordination of navigation and power development so that the possibilities of power development may be considered in connection with navigation improvements and likewise so that the issuance of federal rights for water power development may fit into plans for river work.

Hobart Beresford, for the past year agricultural engineer for the Idaho Power Company, Boise, in charge of rural electrification work, has resigned to become head of the agricultural engineering department of the University of Idaho. **J. C. Baldridge** has been appointed to succeed Mr. Beresford.

Charles Neeley, for many years district manager at Pocatello and Twin Falls for the Idaho Power Company and more recently assistant to **R. B. King**, general superintendent at Boise, has resigned, and with his family will take up life in California.

Harold K. Fox, chief engineer, San Joaquin Light & Power Corporation, Fresno, at the request of the United States Forest Service, addressed a group of irrigationists and business men who recently participated in a tour of the watershed area in the vicinity of Central Camp, Calif., for the purpose of becoming better acquainted with the problems and activities of the Forest Service. Mr. Fox stressed the fact that both power and irrigation are inseparably linked with the problems of the forest service.

Edward Dean Adams, chairman of the committee on the war memorial to American engineers and representative of the Engineering Foundation Louvain dedication, has received in recognition of his work an honorary regree from the University of Louvain and also has had bestowed upon him the decoration of Commander of the Order of King Leopold.

Dexter S. Kimball, since 1921 dean of the college of engineering of Cornell University, has been elected president of the Society for the Promotion of Engineering Education. Professor Kimball is a graduate of Stanford University, Palo Alto, Calif., and in his early years in the West was associated with Pope & Talbot, Port Gamble, Wash., The Union Iron Works, San Francisco, and the Anaconda Mining Company.

Frederick E. Schmitt, for many years associate editor of Engineering News-Record, published by McGraw-Hill Publishing Company, Inc., New York, has been appointed editor of that paper. Since the death last September, of Frank E. Wight, editor of the paper, Mr. Schmitt has been in temporary charge of conducting the paper as managing editor. **V. T. Boughton,** for the past five years assistant editor of Engineering News-Record, has been made managing editor.

Ralpt H. Teed, for the past five years executive engineer, Trinidad Electric Transmission, Railway & Gas Company, Trinidad, Colo., has been appointed general superintendent of the Citizens Electric Company, Hot Springs, Ark.

Arthur W. Frost, district manager, Southern California Edison Company, Porterville, Calif., has been promoted to the position of district manager of six cities in southern California, including the Huntington Beach oil-producing section. **Merritt F. Rhodes** has been transferred from Alhambra to fill the post at Porterville.

John D. Ryan, president, Montana Power Company, with headquarters in New York, has been elected a director of the American Power & Light Company, the holding company for the Montana company.

J. J. Cooper, president, Mountain Electric Company; **C. E. Drennen,** electrical engineer, Hendrie & Bolthoff Manufacturing & Supply Company; and **W. O. Smith,** merchandising representative, General Electric Company, Denver, were among the members of the electrical fraternity of the Rocky Mountain territory who attended Camp Merchandise at Association Island recently.

M. D. Wells, Jr., sales engineer, Mountain States Telepnone & Telegraph Company, has been transferred to Denver from Salt Lake City.

E. A. Will, Allied Industries, Inc., Seattle, recently attended a sales conference in San Francisco.

Thomas Bledsoe, formerly general car foreman at the Salt Lake shops of the Utah Light & Traction Company, has resigned to take a position with the Union Pacific Railroad.

Elected President of Utah Society of Engineers

AT a recent election held by the Utah Society of Engineers, **J. A. Hale,** chief engineer, Utah Power & Light Company, Salt Lake City, was chosen as president. He succeeds L. D. Anderson.

Mr. Hale has to his credit more than fifteen years of service with the Utah Power & Light Company, all of it in the engineering department. A native of Virginia, he began his early career in the construction department of the Norfolk & Western Railroad in Virginia and West Virginia. In 1911 he was graduated from the Virginia Polytechnic Institute, and immediately after went to Utah where he engaged in engineering work in connection with the United States Reclamation Service.

J. A. HALE

After two years in that line of activity he became associated with the company of which he is now chief engineer.

In addition to his activity in the Utah Society of Engineers, Mr. Hale takes a prominent part in the affairs of the Salt Lake Section of the American Institute of Electrical Engineers.

A. L. Alin, formerly with Stevens & Koon, consulting engineers, Portland, has gone to Eugene, Ore., to be supervising engineer for the Eugene Water Board on the dam and power house of the Leaburg power development now under construction by that city. While with Stevens & Koon, who are consulting engineers on the Leaburg Development, Mr. Alin assisted in the design of the dam and power house he is now to supervise.

W. R. Marshall, Pacific Coast district manager, Westinghouse Electric & Manufacturing Company, with headquarters in San Francisco, has returned to that city from Pittsburgh. Mr. Marshall went East to move his family out to California.

Floyd D. Good, who represents the Appleton Electric Company, Seattle, recently returned from a visit to the Chicago offices of that company. Upon his return trip he stopped at Butte and Spokane.

J. H. Devor, assistant sales manager, Wagner Electric Corporation, St. Louis, accompanied by his wife and family, recently left Seattle where he has been visiting for several weeks, enroute to Chicago. While in Seattle Mr. Devor was entertained by **H. E. Cundall,** manager of the Wagner corporation's Seattle office.

Floyd Averill, president, Fobes Supply Company, Portland, Ore., recently made a flying business trip to San Francisco—literally flying, for he made the journey by airplane. Mr. Averill spent about a week or ten days in San Francisco and at the company's branch in Los Angeles.

John R. Richards, vice-president of the Board of Water and Power Commissioners of Los Angeles, has been elected president for the ensuing year. He succeeds R. F. Del Valle, for the past seven years president of the board and a member of the commission for twenty years. Mr. Del Valle was elected vice-president. The other members of the commission are **John R. Haynes, William P. Whitsett,** and **Will E. Keller.**

W. H. Ude, Lewis A. Lewis and E. E. Scofield, all of The Washington Water Power Company, Spokane, have been appointed chairmen, reprectively, of the Public Relations Section, the Commercial Section and the Power Bureau, Northwest Electric Light and Power Association.

D. W. Pontius, vice-president and general manager, Pacific Electric Railway, Los Angeles, delivered one of the principal addresses at the recent convention of the Association of Pacific and Far East Ports in that city.

D. E. Harris, president, Pacific States Electric Company, has returned to San Francisco from a trip East where he attended the midsummer merchandising conferences of the General Electric Company at Association Island, New York.

Miss Jessie Taylor, Los Angeles Gas and Electric Corporation, has been appointed chairman of that company's Women's Committee for the coming year.

W. F. Raber, vice president and general manager, San Diego Consolidated Gas & Electric Company, not long ago visited in Pueblo, Colo., where he formerly was general manager of the Southern Colorado Power Company.

Obituary

Franklin L. Chase, for the past nine years associated with the Globe Electric Company, Seattle, died in that city July 21 after a brief illness.

L. Kemperman, for more than twenty years purchasing agent for the Salt River Valley Water Users Association, Phoenix, Ariz., died in Los Angeles early in July, following an illness of several months.

Manufacturer & Distributor

West Makes Fine Record in Window Display Contest

The West has reason to be proud of the showing it made in the recent nation-wide window display competition conducted by the **Electric Vacuum Cleaner Company, Inc.**, Cleveland, to promote the family idea following the introduction of two new electric cleaners, the Premier Pic-Up and the Premier Junior.

The grand prize, a 1928 Chevrolet, was won by C. W. Ahlroth, of the May Company, Los Angeles, and the first prize in Class C (electric dealers) was awarded to J. U. Berry, of the Valley Electrical Supply Company, Fresno, Calif. Honorable mention in Class A (central stations) and $10 was awarded to E. Morrison, Northwestern Electric Company, Portland, Ore., and J. Brown, San Diego Consolidated Gas & Electric Company, La Jolla, Calif.; and to J. Brock, San Diego Consolidated Gas & Electric Company, La Mesa, Calif., who was awarded $5. In Class B (department stores) honorable mention and $5 went to M. B. Wallace, Taylor Bros. Company, Provo, Utah; and in Class C (electric dealers) honorable mention and $5 was won by Mervin Levy, Levy Electric Company, San Francisco, and R. O. Mulligan, Reliance Electric Service Company, Los Angeles.

The contest aroused much interest and resulted in a record-breaking number of entries. Officials of the company state they are highly gratified by the response, not only because of the fine displays that were submitted but because a check-up has demonstrated that the various companies competing enjoyed a substantial increase in sales as the result of their participation.

The judges who made the awards were W. L. Stensgard, president, International Association of Display Men; C. C. Agate, managing director, Window Display Advertising Association; Thomas F. Logan, president, Lord & Thomas and Logan; and B. M. Fast, sales manager, Associated Gas & Electric Companies.

Union Oil Company Adds Two Vice-Presidents—Under a new administration plan devised by W. L. Stewart, president of the **Union Oil Company**, to handle the rapidly increasing responsibilities caused by the company's growth within the United States and abroad, two new vice-presidents have been added to the official personnel of the company. R. D. Matthews and Paul N. Boggs are the two officials elected at a recent directors' meeting. The remaining officials include R. J. Keown, treasurer, John McPeak, secretary, E. W. Clark, executive vice-president, and W. W. Orcutt and L. P. St. Clair, vice-presidents.

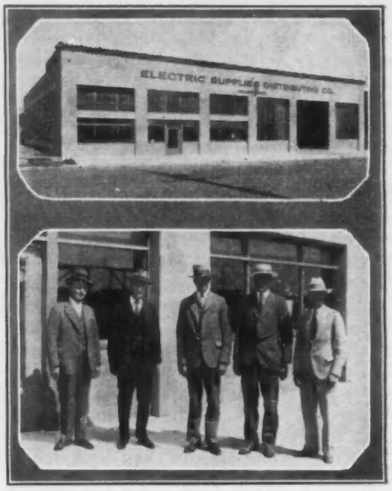
Change of Corporate Name—Since the corporate name of the **Beaver Machine & Tool Company, Inc.**, Newark, N. J., dates back to pre-war days and since 1919 has been misleading, the company has changed its corporate name to Beaver Manufacturing Company. This change in name involves no change in ownership or policy, and the company will continue manufacturing its line of wiring devices under the trade name of Beaver.

Electric Ranges for the Army—An order for 1904 full automatic black Japan finish console type electric ranges recently was placed by the quartermaster general's office of the U.S. Army with the **Westinghouse Electric & Manufacturing Company**, Pittsburgh. These are to replace worn-out gas, wood and coal ranges in officers' quarters in the various army posts where electric current is available.

This window, dressed by C. W. Ahlroth of the May Company, Los Angeles, won the grand prize in the window display contest recently conducted throughout the nation by The Electric Vacuum Cleaner Company, Inc., Cleveland.

Distributors Move into New Building

After a ten years' occupancy of quarters in the Spreckels Theatre Building, San Diego, Calif., the Electric Supplies Distributing Company is established now in its own building at 435 Second St. in that city. The company is justly proud of its new building, whose Spanish type of architecture



gives it a decidedly pleasing appearance.

Officers and directors of the company are (left to right) Walter C. Wurfel, president; Grant Guthrie, secretary and treasurer; Sam L. Hall, vice-president and manager; Basil G. Guthrie, purchasing agent; and Fred G. Goss, sales manager.

The company, which was incorporated in 1918, handles a general line of electrical supplies, fixtures, radios, appliances, ranges and water heaters.

Moloney Electric Company Founders Aquire Control

T. O. Moloney and James J. Mullen, who organized the **Moloney Electric Company**, St. Louis, thirty-one years ago, have acquired control of that company. The sale recently was approved by the American Brown Boveri Electric Corporation, the holding company. The sale involves the consolidation of the Moloney Electric Company with the Moloney Realty Company. Mr. Moloney will be president.

The company recently moved into a new factory at 5390 Kingshighway Northwest, but the old factory is being retained as a branch.

District Representative Appointed—The appointment of James H. Southard as its district representative in Nevada and central and northern California has been announced by **The American Transformer Company.** Mr. Southard, who also is district representative for the Western Electro-Mechanical Company and the Weston Electrical Instrument Corporation, has headquarters at 682 Mission St., San Francisco.

They Supervise a Large Selling Force

Sales managers of the **National Carbon Company, Inc.**, had their pictures taken at the Radio Manufacturers Association Show held recently in Chicago. Seated, left to right—H. S. Schott, general sales manager; Rodney Morison, Jr., Atlanta district manager; C. E. Anderson, Kansas City district manager; J. M. Spangler, Chicago district manager. Standing—C. B. Clendenen, San Francisco district manager; D. G. Raymond, New York district manager; George Furness, manager of Radio Division. The group surrounds the company's new die-cast aluminum receiving set and loud speaker unit which they introduced at the R.M.A. Show.

Neon Tube Light at Mouth of Los Angeles Harbor

A tower 15 ft. high and 4 ft. square is being erected on the roof of the new lookout station under construction at the entrance to the Los Angeles harbor, on which will be installed a Cooper-Hewitt red neon tube, manufactured by the Cooper-Hewitt Electric Company, Hoboken, N. J. This device for fog penetration is one of the company's latest developments, and the light can be seen for many miles at sea.

By special arrangement with the manufacturer, it will also serve as a marker of the harbor district for aircraft, and its fog-penetrating qualities will make it of great value to navigators of the sea and the air.

John T. Shannon, manager of the Keese Engineering Company, Los Angeles, West Coast distributors of Cooper-Hewitt products, is donating a huge ship's lantern to encase this beacon light and is personally supervising its installation.

To Distribute Radio Sets—Announcement has been made by G. E. Cullinan, vice-president in charge of sales for the **Graybar Electric Company**, New York City, to the effect that the company soon will distribute a complete line of Graybar radio receiving sets.

Takes Over Company — Announcement has been made by the **Reynolds Electric Company**, 2650 W. Congress St., Chicago, that it has taken over the Korrectolite Company and that E. F. Oliver, formerly general manager of that company, has become associated with the Reynolds company.

Sales Manager Visits Coast—C. E. Searle, sales manager, **Allis-Chalmers Manufacturing Company**, Milwaukee, recently spent some time on the Pacific Coast visiting the company's various branches. After stopping in Los Angeles and San Francisco, Mr. Searle proceeded to the Northwest where he conferred with John Alberts, manager of the company's Seattle office, and also with Eicher & Bratt, who represent the Pittsburgh Transformer Division of the Allis-Chalmers company.

To Handle Line of Electric Ranges—**George Campe, Inc.**, 611 Howard St., San Francisco, has taken on the Peninsular line of electric ranges for distribution in northern California, according to announcement of Thomas E. Reed, who represents the Peninsular Stove Company, Detroit, Mich., in California, Oregon and Washington.

Builds Plant—Another addition to its plant is being built by the **Brown Instrument Company**, Philadelphia. The new structure will be 60 ft. long by 44 ft. deep, two stories in height. Other floors may be added as future requirements demand. This addition has been made necessary by the rapid growth of the company and the enlargement of its line.

Kodel Electric & Manufacturing Company is the new name of the Kodel Radio Corporation, Cincinnati, Ohio. The change in name was decided upon because of the demand for Kuprox rectifying elements in industrial electrical applications for telephone, cable, telegraph and signal systems, X-ray and similar uses, the company explains.

Two Manufacturers' Agents Effect Consolidation

Martin Woodard, president, **Martin Woodard Company of San Francisco**, has announced that the lines formerly handled by Belden S. Gardner, manufacturers' representative of San Francisco, now will be handled by the Martin Woodard Company. Mr. Gardner will devote his time to the development of all of the lines handled by that company.

Among the companies which the Woodard company now will represent are American Mica Works, Anchor Webbing Company, Baldor Electric Company, Federal Telephone Manufacturing Corporation, The Macallen Company, Signal Engineering & Manufacturing Company and the Gilby Wire Company.

George R. Sovreign is vice-president and general manager of the Martin Woodard Company of San Francisco.

Company Forms Electrical Sales Division

Announcement has been made by the **Chicago Steel Tank Company**, 6400 West 66th St., Chicago, of the formation of its electrical sales division and its re-entrance into the direct sales field with its line of electrical conduit fittings which, in the past, has been marketed under private trade names of other manufacturers.

Items of the company's manufacture will bear the "CST Superior" label. The line consists of armored cable connectors, locknuts and bushings, conduit nipples, all sizes, extension pieces, hickeys, fixture studs, pipe straps and box cleats.

Two Red Seal Homes

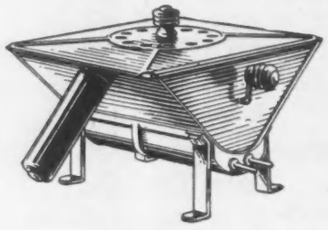
These two Red Seal homes are being built in South Pasadena by J. Pierre & Son, San Marino, Calif., for J. L. Kline of the Western Light & Fixture Company and H. S. Detrick of the Detrick-Joslyn Company, both of Los Angeles.

New Equipment

Electric Popper

The accompanying illustration shows the new improved, low-priced electric corn popper which has been placed on the market by **Gobar Products**, Anderson, Ind.

This appliance, which will pop the corn in three minutes, is of ample capacity, one hopperful filling two standard 5-cent bags. On account of the hopper shape of the utensil, only the unpopped kernels come in contact



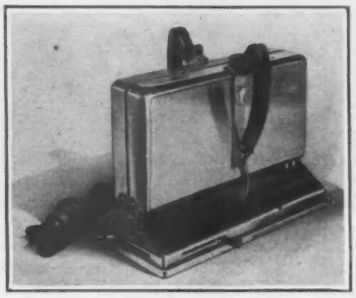
with the heating element, thus preventing burning of the popped corn, and the device has a wooden handle and wooden knobs to prevent burning of the fingers. Each popper is packed in an individual container and may be obtained by the consumer at $1.50 in pistol blue steel, and at $2.50 in nickel. —Electrical West, September, 1928.

New Type Percolator and Automatic Toaster

An entirely new line for **Thomas A. Edison, Inc.**, Orange, N. J., is that of new type percolators and automatic toasters, which are being placed on the market by that company.

The percolator, which makes coffee by the drip method, is equipped with two compartments and two faucets, one for hot water and one for coffee. After boiling water has passed through the coffee into the coffee compartment, the beverage is kept hot by a plate under this compartment but the coffee does not boil. Enough hot water is left in the separate compartment to weaken the coffee or to make tea, if desired. The appliance is finished in nickel. The intended retail price is $17.50.

The toaster accommodates two slices of bread, both sides being toasted at the same time, and the toaster opens automatically when the toast is done. Nichrome wire is used in the elements and the appliance carries a rating of



660 watts. The intended retail price is $15.

Both percolator and toaster are guaranteed by the company for one year.—Electrical West, September, 1928.

Portable Electric Fireplace

A portable fireplace especially adapted for the Magicoal electric fire is being marketed by **H. A. Bame**, U. S. agent for Berry's Electric, Ltd., 101 Park Ave., New York.

The fireplace is easy to install. It is simply set in position and the Magicoal electric fire is connected to the nearest base plug or light socket. The Bame portable electric fireplace, mantel and hearth can be supplied to harmonize with any room setting or style of furniture. They come in natural woods, and are finished exactly to resemble marble or stone, the announcement reads. They are particularly well adapted for the use of Magicoal electric fires without heating attachment. Also the grate and frame complete with Magicoal electric fire, with or without concealed heater, can be furnished in any size desired to fit into any specified mantel.—Electrical West, September, 1928.

Switch for Rural and Farm Lighting—A new open-type Fuswitch designed for rural and farm lighting and railroad use to meet the demand for a dependable open-type Fuswitch of high rupturing capacity to sell at a low price has been announced by the **W. N. Matthews Corporation**, St. Louis. It is known as No. 1317 and has a rating of 100 amp. and 7.5 kv. It is a vertical open-type switch especially designed for 6.6 and 6.9-kv. service and is adaptable to 2.3 and 4.4-kv. service. It is equipped with the patented Matthews double-tube, horn-fiber, vacuum cartridge which has been used for many years in the closed-type Matthews Fuswitches.—Electrical West, September, 1928.

New Kliegl Spotlight

Complete operation of Mazda-type Kliegl spotlights, including the control of four or more color frames, now may be accomplished from any desired point, according to an announcement of **Kliegl Bros.**, New York. The spotlight itself may be located wherever requirements dictate, frequently in cove, sealed and inaccessible places, and the control may be placed wherever it is most convenient for the operator. A group of spotlights may be controlled just as easily as one.

Heretofore there has been no way of changing at will the color of the light beam, except by the manual removal and insertion of different color frames. Now, through the perfection of this new device, in which the operation of the color frame is controlled electromagnetically, the entire service of the spotlight in respect to white lighting, color lighting, and dimming, may be controlled from a distant point.—Electrical West, September, 1928.

Dinkey Controller

A new Dinkey controller has been added to its line by **The Electric Controller & Manufacturing Company**, 2700 East 79th St., Cleveland.

The principal features of this controller are listed as follows: Ebony asbestos used in place of slate; ventilated contacts raised 9/16 in. from the dial face; contact supporting lugs attached to the front of the dial and removable from the front; contact lug has a single square-head set screw to clamp the lead wire tightly; welded steel frame; main arm carried on ball bearings; smooth center top, of notch top and roller type; bearing-spider casting supports dial as well as arm and quadrant

bearings, insuring correct alignment and even contact pressure; nickel alloy resistors, guaranteed against breakage in shipment and in service for one year. —Electrical West, September, 1928.

Enclosed Circuit Breakers—Three types of enclosed circuit breakers, ESF, ES and EI, have been added to its line by the **Roller-Smith Company**, 233 Broadway, New York City.—Electrical West, September, 1928.

Electric Spray

To round out its line of self-contained, portable electric spraying devices, **The Electric Sprayit Company,** South Bend, Ind., is introducing a new rotary compressor type electric Sprayit.

This Superior model electric Sprayit was designed for the application of

paints, enamels, varnishes, lacquers and shellac where a fine finish is necessary. Pressure for break-up of materials to be applied is obtained by the self-contained, direct-connected rotary compressor, the rotor of which is mounted on the armature shaft of the motor. This three-bladed rotor is self-lubricated. The pressure developed in this model is stepped up in the specially designed fluid tip and nozzle to a point sufficient to handle practically any type of material.—Electrical West, September, 1928.

Water Heaters

A constant dependable hot water supply for all domestic purposes at a moderate cost is provided by a new storage type water heater, according to its manufacturer, **A. J. Lindemann & Hoverson Company,** Milwaukee.

The heating element is directly immersed in the water supply, thus providing for the immediate absorption of the heat units as they are generated. The heat thus most directly applied to the water gives the greatest degree of efficiency and this is maintained by the thorough insulation of 2½ in. of wool felt, the maker states.

These heaters are automatically controlled by a mercury switch contactor actuated by a helical thermostat. This thermostat is inserted inside a brass housing which extends inside the water and is in direct contact therewith. The thermostatic control can be adjusted to deliver water at from 120 to 200 deg. F. at the top of the tank. Electrical connections are in a cutout box in the base of the heater. The heater unit can be removed for cleaning without disturbing the plumbing or other electrical connections except the connections of the unit itself. Heaters work equally well on direct or alternating current and are not affected by frequency or voltage changes.

The heater has a baked japan finish in Nile green.—Electrical West, September, 1928.

Radio Sets

Two a.c. (batteryless), 7-tube radio sets and one 6-tube battery-operated set are being manufactured by the **National Carbon Company, Inc.,** New York City, which has announced its entrance into the radio field.

One of the 7-tube sets is of die cast aluminum, of dark green color with routed silver striping. It is of one-dial control and has a recessed control panel, illuminated drum dial, two additional knobs for volume control and antenna trimmer, respectively.

Dimensions: height over all with legs, 27 in., length 22¾ in., width 10¾ in., height of set itself 9⅛ in. This set can be used either as a table set, removed from its pedestal legs, or with its supports can serve not only as a radio set but as a decorative side or end table. This is true also of the other 7-tube set whose cabinet is of natural maple finish. Dimensions: length 24⅛ in., height 10¼ in., width 11¼ in.; in combination with pedestal legs, which are detachable, the height over all is 27¼ in.

The 6-tube battery-operated set in natural maple finish can be used either with its pedestal or as a table set. Dimensions: base 13½ in. square, height 10 in., pedestal at base 16½ in. square, top of pedestal 14½ in. square, height of pedestal 20¼ in., height over all 30¼ in.—Electrical West, September, 1928.

Electrical Toys

In preparation for the 1928 holiday season the **Lionel Corporation,** 48 East 21st St., New York City, is adding to its line of electrical toys a power station, 26 in. long, 21½ in. wide and 18 in. to the top of the stack. There is provision in the power house for two Lionel transformers.

Another addition to its line is the steel bridge for "Lionel Standard" track. This bridge, which is modeled after the famous Hell-Gate bridge which spans the East River, is 28¾ in. long, 11 in high and 10½ in. wide.

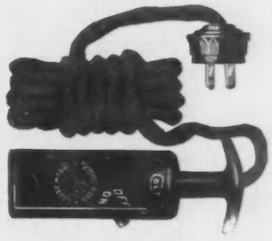
A third new toy is a station and terrace with landscaped flower beds. The ticket station is illuminated inside and outside with electric bulbs, and several torches illuminate the terrace. This station is 31½ in. long, 18 in. deep and 12 in. high—Electrical West, September, 1928.

Cord Set and Four-Way Outlet

Two new electrical devices are being marketed by **Colt's Patent Fire Arms Manufacturing Company,** Hartford,

Conn. One of these is a four-way electrical outlet in color which permits the use of one to four electrical appliances within current load limits. This device, which is known as the "Foursome," may be obtained in six colors, green, black, walnut, onyx, mahogany and red.

The other device, the "Kool-Pull" cord set, is equipped with a "Red Pull" which prevents fraying cords, broken



connections, short circuits and scorched fingers, according to the manufacturer. It is easy to plug in or pull out, is made with or without switch, and fits all standard appliances. — Electrical West, September, 1928.

Steel Pole

The Weltrus steel pole has been placed on the market by the **Truscon Steel Company,** Youngstown, Ohio.

This pole is composed of two channel chord members rolled in one continuous length from special sections of copper-bearing steel, according to announcement of the manufacturer. The chords are connected at suitable intervals by a continuous lattice web member, made from plain, round sections, thus forming a simple Warren truss. Connections are autogenously welded by automatic machinery which accurately regulates the time, current, and pressure uniformity of each weld.

These Weltrus poles, with hot-dipped galvanized crossarms and fittings, having all the durability and dependability inherent in such construction, can be built at a cost per mile not greater than is paid for inferior types of construction, the manufacturer states.

The poles are fully described in Catalog No. 1300, copies of which may be obtained upon request.—Electrical West, September, 1928.

Portable Heaters in Color

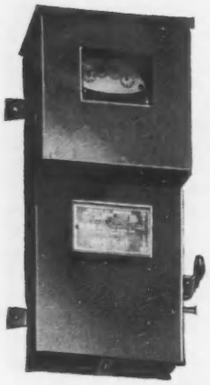
In keeping with the new vogue for color, the **Liberty Gauge & Instrument Company**, Cleveland, has added to its line of portable heaters the new Liberty Golden Glow heater in five colors—

lettuce green, orchid, ivory, rose and bronze.

The reflector bowl of the heater is spun of 18-oz. solid copper and is 13 in. in diameter. The appliance is equipped with thumbscrew adjustment for easy tilting and has a perforated base for hanging from the wall. The heating element is of Nichrome. Bronze finish, $4.65; colors, $4.95 retail.—Electrical West, September, 1928.

Combination Meter Cabinet and Entrance Switch

To meet the need for a meter box to be placed on the outside of a residence, **The American Electric Switch Corporation**, Minerva, Ohio, has placed on the market a combination meter cabinet and entrance switch. The box



is constructed of 16-gage steel, electrically welded with non-breakable glass window over meter. It is watertight and rust-proof, being "Parkerized" and then finished in black waterproof baking enamel. It will accommodate all types of meters ordinarily used. The dimensions for the 30-amp. sizes are 6½ in. high over meter, 3⅝ in. high over switch base, 7½ in. wide and 18 in. long; for 60-amp sizes, 6½ in. high over meter, 4½ in. high over switch base, 9 in. wide, 24 in. long. The assembly includes the 30 and 60-amp switch mechanisms for two or three-wire, sealed main fuses or accessible main fuses or a 60-amp test block. The usual sealing and locking devices are employed on the boxes.—Electrical West, September, 1928.

Intermediate Base Lamp Holders

To meet the demand for lamp holders taking a lamp smaller than the medium base yet larger than the candelabra size to fit the new S-11 bulb lamp, an intermediate line of wiring devices has been produced by **The Bryant Electric Company**, Bridgeport, Conn.

These sockets with intermediate screw shells now can be secured in the following syles: brass shell key, keyless, and pull sockets; composition

candle pull sockets; Templus pendant weatherproof sockets, porcelain keyless candle sockets and sign receptacles.

Of particular interest to sign makers is the new Bryant line of intermediate size receptacles for surface wiring and for metal signs. The new series includes an adapter from standard to intermediate base.—Electrical West, September, 1928.

Suspension Joint Fitting

A new type of self-aligning suspension fitting for conduit work has been placed on the market by **The Adapti Company**, Cleveland.

This fitting, which is adaptable for use with all standard conduit fittings as well as The Adapti Company's Adaptiboxes and Adapti-lets (solid fittings), consists of a universal joint enclosed in a cast-iron outer shell. The upper end carries an external thread to screw into the T-fitting in the conduit run, and the lower end carries an internal thread for attaching to the stem of the lighting fixture which it supports. The universal join is so made that it cannot possibly turn around, thus protecting the wires which pass through it from all chance of abrasion or twisting. It will permit the fixture to swing freely in any direction to the extent of 20 deg. or more, and since the universal joint itself is made of brass permanent freedom of movement is assured, the manufacturer states.—Electrical West, September, 1928.

Unit Receptacle

A Bakelite unit receptacle combining both plate and receptacle is being offered to the trade by **The Connecticut Electric Manufacturing Company**, Bridgeport, Conn. This combination

makes it unnecessary for the contractor to install two or more parts as he has only to hook in the wires and screw on the plates with a resultant saving of time and labor.

The receptacle box is small, affording extra room in the wall for wires, and the terminals are recessed, making for further compactness. Double contact with each plug terminal is secured by special spring metal contact arms which grip the plug terminals securely but not too snugly for easy removal of the plug. The mounting screw holes are elongated to assure perfect alignment of the plate when on the wall. The plate is ⅛ in. thick, and special reinforcements on the back give it added strength.—Electrical West, September, 1928.

Electric Motor—A new electric motor with a power factor ranging from 90 to 100 per cent and efficiency ranging from 70 to 90 per cent has been placed on the market by the **Howell Electric Motors Company**, Howell, Mich. The motor consists of a plain squirrel cage motor, without commutator, brushes or other devices, and does not differ in general construction from an ordinary polyphase motor. The only auxiliary apparatus is the compact cut-steel box containing the necessary condensers which can be mounted conveniently either on the wall or the equipment on which the motor is used. This motor is suitable for plugging or for use on reverse speed duty by means of a three-phase reversing switch.—Electrical West, September, 1928.

Low-Voltage Bus Supports—A new line of low-voltage bus supports for voltages from 220 to 4,500 is being manufactured by the **Delta Star Electric Company**, 2400 Block, Fulton St., Chicago.—Electrical West, September, 1928.

Direct-Current Motor—A new direct-current motor, type DM, has been added to its line by the **Century Electric Company**, 1806 Pine St., St. Louis. This motor is built in sizes from 1/6 to ½ hp. at speeds corresponding to standard speeds of a.c. motors.—Electrical West, September, 1928.

Recent Publications

Hotpoint Supplement—H-523 is a general supplement to the Hotpoint Electric Servants Catalog No. H-50, published by the **Edison Electric Appliance Company, Inc.**, Chicago.

Industrial Signals—Bulletin 54, in colors, illustrates and describes the industrial signals manufactured by the **Benjamin Electric Manufacturing Company**, 120 South Sangamon St., Chicago.

Remote Control Equipment—This is the self-explantory title of Bulletin No. 10, issued by the **Hart Manufacturing Company**, of Hartford, Conn. It contains full description, specifications, illustrations and diagrams.

Flush Receptacles and Plates—A new folder illustrating in colors and describing a new line of receptacles with DeLuxe inlaid wood, Templus and brass plates is being distributed by the **Bryant Electric Company**, Bridgeport, Conn.

Steel Doors—Catalog 110 covers the different types of copper alloy steel doors manufactured by the **Truscon Steel Company**, Youngstown,Ohio. This catalog contains much information in the way of detailed descriptions, specifications, illustrations and diagrams.

Lighting—Bulletin LD-109C, "Lighting of Schools and Gymnasiums," and Bulletin LD-144A, "Street Lighting with Mazda Lamps," are being distributed by the **Edison Lamp Works** of the General Electric Company, Harrison, N. J. Both are fully illustrated.

New Achievements in Lighting—This pamphlet contains full descriptions and illustrations of the various electric light fixtures manufactured by **The O. C. White Company**, 15-21 Hermon St., Worcester, Mass.

Electric Ranges—Catalog 16, with price list, is being distributed by the **Standard Electric Stove Company**, 1718-1720 North Twelfth St., Toledo, Ohio. It contains complete specifications and illustrations of the company's line of electric ranges, heavy-duty ovens, toasters, broilers, griddles, hotplates, serving tables, water heaters and other appliances.

Water Heating—Bulletin No. 36, "A New Method of Heating Water Electrically," describes the Pemco storage type electric water heater manufactured by the **Philadelphia Electrical & Manufacturing Company**, 1228-36 North 31st St., Philadelphia. The company's Bulletin No. 37 describes its commercial unit for outdoor lighting.

The Electrification of the Mexican Railway—This is the self-explanatory title of GEA-851 published by the **General Electric Company**, Schenectady, N. Y. The reading matter is enlivened with numerous pictures.

"The Autobiography of a 'Black Beauty' Pole"—This is a small booklet written in readable style and published by the **Texas Creosoting Company**, Orange, Texas, describing the evolution of a "Black Beauty" pole from its original stand in the forest to its ultimate destiny as a power pole.

Superheater for Power Plants—Bulletin T-1, a catalog describing and illustrating the design, construction and application of the Elesco superheater to power plants, has been issued by **The Superheater Company**, 17 East 42nd St., New York, under the title, "The Elesco Superheater for Power Plants." The book contains much information and many illustrations and diagrams.

Insulators—In Bulletin No. 12 are described the one-piece porcelain pin-type insulators for transmission and station work manufactured by the **Jeffery - Dewitt Insulator Company**, Kenova, W. Va. The booklet contains numerous photographs and drawings.

Groundulets and Other Safety Circuit Devices—This is the self-explanatory title of Bulletin G-7 issued by the **Crouse-Hinds Company**, Syracuse, N. Y. It contains numerous illustrations and diagrams. "Ground for Safety," Bulletin G-8, contains instructive information in wiring methods and a very fine wiring diagram drawn in much detail.

Automatic Arc-Welding—A well illustrated booklet, "Automatic Arc-Welding by the Electronic Tornado Process," is being distributed by **The Lincoln Electric Company**, Cleveland.

"'Caterpillar' Power for Public Utilities"—The various uses to which the caterpillar tractor can be put by public utilities in the construction field is described in this booklet issued by the **Caterpillar Tractor Company**, San Leandro, Calif.

Ohmmeters—Bulletin No. 300 describes types COM, GOM and SOM portable, direct-reading, slide-wire ohmmeters manufactured by the **Roller-Smith Company**, 233 Broadway, New York.

Specialties for Electric Ranges—Bulletin No. 130, issued by **H. O. Swoboda, Inc.**, 3400 Forbes St., Pittsburgh, describes that company's line of Falcon specialties for electric ranges. These include open radiant oven heaters, oven receptacles, baffle plates, connection blocks and open radiant top heaters.

Resistance Thermometers—Catalog No. 93, fully describing the applications and types of Brown resistance thermometers as applied to modern industry, has been published by **The Brown Instrument Company**, Philadelphia. It contains a number of full-page illustrations and diagrams.

Switch Houses and Closing Mechanism—Bulletin No. 458-3, "Switch Houses for Outdoor Service," which supersedes Bulletin 458-2, and Bulletin No. 473, "Type MO-1 Motor Operated Closing Mechanism for Oil Switches and Circuit Breakers," are being distributed by the **Condit Electrical Manufacturing Corporation**, Boston.

"Universal, The Electric Ware Beautiful"—Under this title **Landers, Frary & Clark**, New Britain, Conn., have prepared a complete catalog of their electric appliances de luxe and their new popular priced line. The Universal electric ware beautiful is divided into four general groups, and excellent illustrations present the various types of appliances. The company manufactures a complete line of percolators, hot water kettles, toasters, waffle irons, table stoves, hot plates, cookers, heating pads, irons and vacuum cleaners, and these are all fully illustrated and described in the catalog.

Air Break Switches—Bulletin No. 15, descriptive of Types Y and YS air break switches, is being distributed by the **Pacific Electric Manufacturing Corporation**, 5815 Third St., San Francisco. These switches are the modern development of the original Baum double break switch, first manufactured in 1903, the company states. The pamphlet contains numerous diagrams and tables. Copies may be obtained upon application to any of the company's offices.

Electric Heating—"Published in the interests of better heating for modern homes," an attractive booklet is being distributed by the **Majestic Electric Appliance Company, Inc.**, San Francisco, Kansas City and Philadelphia. After briefly stating the advantageous features of electric heating, the booklet sets forth the advantages of Majestic electric heaters with illustrations of the different models and detailed specifications. Then follow numerous excellent illustrations showing representative installations. Two pages are given over to instructions for the calculation of room heating capacities, and the remaining pages discuss the Majestic thermostat and electric water heater.

Electric Heaters—Under the title, "Now! Electric Heat at Low Cost," **The Apex Manufacturing Company**, Emeryville, Oakland, Calif., describes its different types of electric air heaters.

ELECTRICAL WEST Barometer of Industrial Activity in Western States

Productive operations of the manufacturing plants of the Western states during July were on a plane considerably below that of last year, according to basic data received on electrical energy consumption by about 400 large manufacturing plants operating in this section. The index of the general industrial operations in the section during July was 116.5 as compared with 118.5 in June and 125.4 in July last year. Several of the important industrial groups are reporting under this time last year, some failing to show the upward trend which operations during the past five years would lead one to expect.

The food products industry reported a slight drop in the rate of operations during July, even after corrections are made for the number of working days. The July rate of operations in these plants was 1.8 per cent under June, whereas last year an increase of 20 per cent was reported for the same period. As a result of these conditions, the current July rate of operation in the food products industry was about 19 per cent under July last year. It is probable that August will witness a material increase in the activity within these plants.

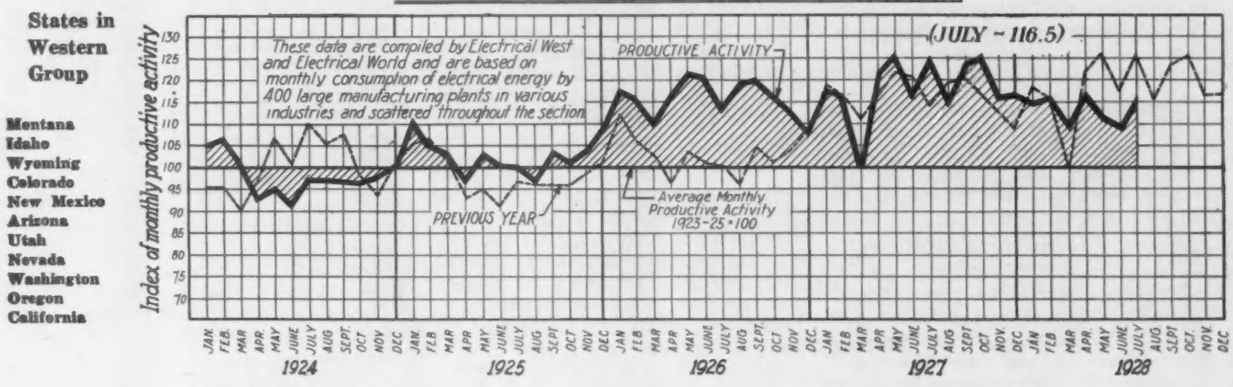
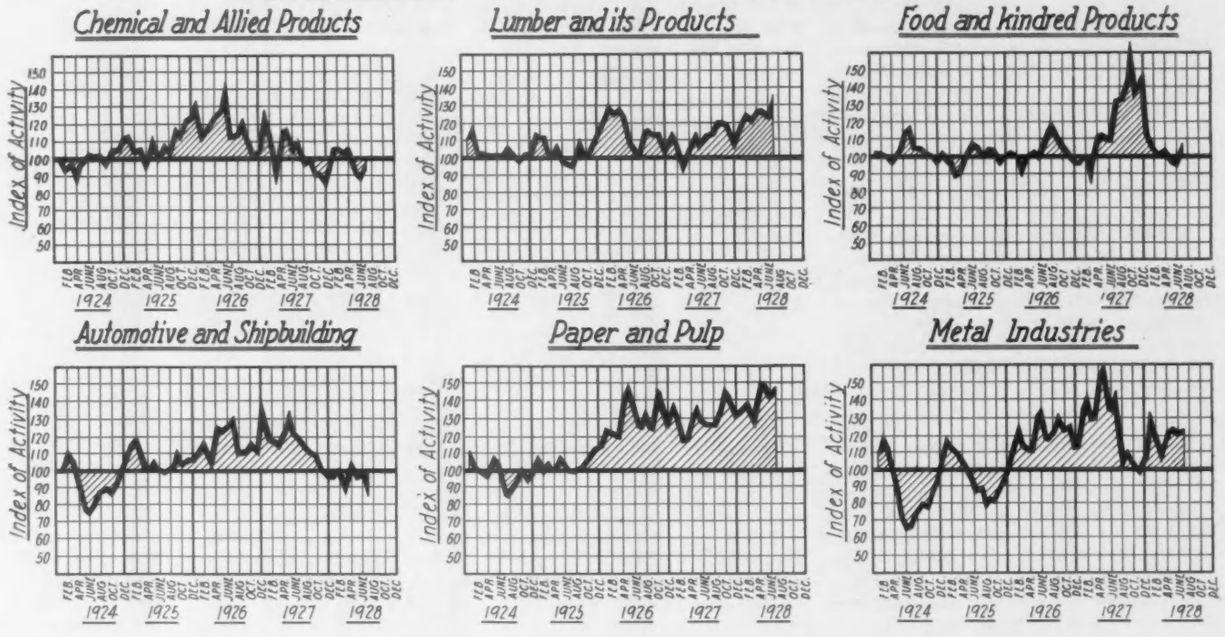
The lumber industry of the West continued to operate on a high plane, the July rate of operation being the highest reported by the industry, breaking the former record set in June. Current July operations were at a rate abont 20 per cent over July last year. This industrial group has been slowly increasing its rate of operation ever since last December.

Indexes of Industrial Activity in the Western States
(All figures adjusted for number of working days.)

	July 1828	June 1928	July 1927	Aug. 1 7 mo. 1928	Aug.1 7 mo. 1927
All industry	116.5	118.5	125.4	115.4	118.0
Chemical and allied products	92.3	88.2	110.8	99.1	111.7
Food and kindred products	108.3	110.4	133.5	104.5	106.7
Lumber and its products	135.8	132.2	112.8	127.0	108.7
Metals group	123.4	122.2	144.2	123.3	143.8
Paper and pulp	147.5	144.5	127.5	142.8	130.8
Rubber and its products	160.0	136.8	116.6	146.4	
Shipbuilding	75.6	95.7	109.8	93.1	122.7
Stone, clay and glass	111.5	153.0	150.0	147.8	
All industry, United States	120.2	116.4	110.6	119.9	115.7

GENERAL PRODUCTIVE ACTIVITY IN THE WESTERN STATES

– Adjusted for number of working days but not for seasonal variation.



PRODUCTIVE ACTIVITY IN THE PRIMARY INDUSTRIES OF THE WESTERN STATES